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The AUTOMOBILE

Tire Repairs—Roadside and Garage

Knowledge of Proper Methods of Curing Trouble Will Cut the Annual Cost in Half

By J. Edward Schipper

Part I—On the Road

Results of driving flat

A LITTLE tire trouble with a medium-sized car can make such a hole in a one-hundred dollar bill that there won't be enough left for a good cigar. You can spoil by careless assembling or defective rims any number of inner tubes without having the car move a foot. All this and endless other sources of tire trouble and expense come from two causes: first, a lack of knowledge; second, failure to apply the knowledge.

The driver of a car should have two branches of tire knowledge at his fingers' ends. He should know how to take care of the tires on the road and also how to take care of them when the car is on the garage floor.

On the road, the puncture, blowout, and impending blowout are the situations to be met and dealt with; in the garage the permanent mending of tubes and the doctoring of the tire shoes will keep the careful driver busy on an average of an hour a week.

Locating the Puncture

As soon as the puncture occurs—stop. That rule if observed would save hundreds of dollars a year for tire owners. Driving a hundred yards to the next lamp post is often enough to cut the tube to ribbons and to destroy the further usefulness of an expensive shoe. If you have to reach the post, do it on the bare rim.

Next remove the tire and locate the puncture in the tube. To do this apply the pump to the tube and see if it can be pumped up to the shape it would occupy within the shoe. If the puncture is a large one, the hiss of the escaping air will show its location. If it is a small leak, and cannot be heard, look the surface of the tube over carefully and spread a little saliva thickly over the suspected spots. If bubbles occur you have the leak. If there is a tub or basin of water at hand, immerse the tube after it has been pumped to a pressure sufficient to render it round and firm, and note the spot from which the bubbles issue. That will be the leaky spot. The location of the puncture can most often be discovered by searching the exterior of the shoe as soon as the puncture occurs. Nine times out of ten a nail will be found buried to the head, or a sharp stone or piece of glass will be discovered. Soapy water will locate the smallest leak on account of the soap bubbles that are blown for a long time after the application.

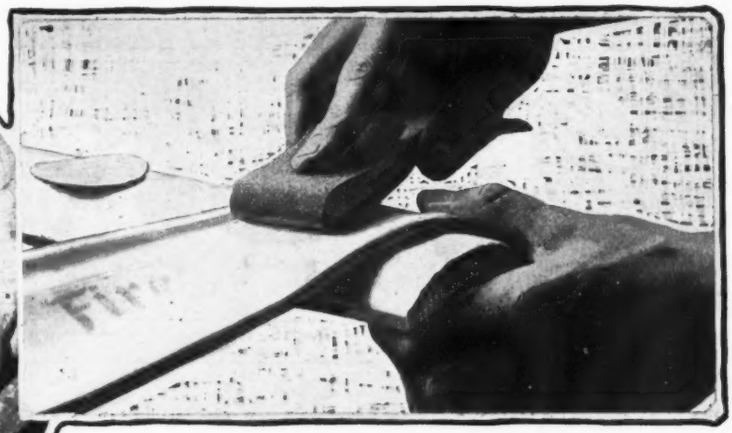
Three Ways to Repair a Puncture

Whether you repair the puncture on the road or at the garage, there are three ways of doing it; 1, the cement patch; 2, the no-cement patch; 3, the vulcanizer. The way of going about the work is as follows:

Cleanliness is the first requisite of a good job with a cement patch. The next requisite is good judgment. It is impossible to cover up a large hole with a patch that is just a little larger than the tear, and expect that it will hold an air pressure of 80 pounds to the square inch. Unless compelled to, do not try a patch on a hole larger than .4 inch in length or diameter on any tire above 3.5 inches in diameter. It will not hold for any length of time.

When the leak is found, hang the tube over the front fender, with the leak up. Draw a small quantity of gasoline from the carbureter drain cock and take a small piece of emery cloth or sandpaper from the tool kit. These with the patch will be your tools. From the box of assorted patches, take one of sufficiently large size to cover the leak and still have a good grip on the tube. The length or diameter of the patch should be at least eight times the diameter of the hole. On holes above .25 inch the 2-inch circular patch will not last long. As most of the tears are longer than they are in width, the elliptic patches which are made in sizes up to just over 5 inches in length and 2.25

A—Locating the leak in a basin of water



B—Roughing the rubber around the puncture

inches in width will take care of a larger size cut than the above.

With the sandpaper roughen the surface of the tire around the leak and also roughen the faying surface of the patch. This will make it adhere better. Clean the roughened surfaces of the tire and patch thoroughly with gasoline and cloth, and when this is dry apply a coat of tire patching cement with a glue brush or match stick. Allow this coat of cement and one more to dry thoroughly. Apply a third coat of cement and when this becomes dry enough to be very tacky apply the patch firmly to the tube. Lay the tube flat and place a weight on it, allowing it a half-hour to set firmly. Less time than this can be taken if on the road, the longer time makes a better job. Sometimes on the garage or other smooth floor, the tire can be laid down and a car rolled on it.

No-Cement Patches Are Quick

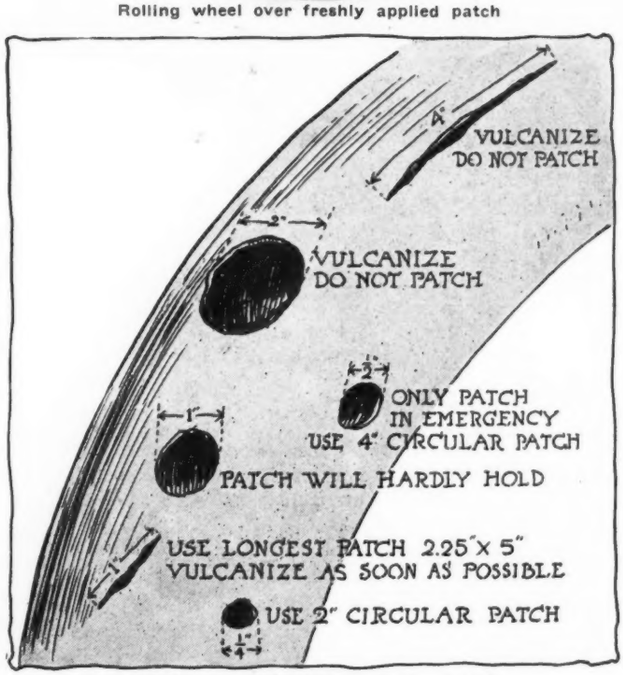
For a hurry-up emergency job on a very small puncture, nothing surpasses the no-cement patch. When the leak is located select a patch large enough for the hole, eight times the diameter if possible, and clean the tube thoroughly with gasoline around the puncture. Tear off the linen cover over the no-cement patch and smear gasoline thoroughly over its surface. When the gasoline dries enough for the cement on the patch to be quite sticky, apply the patch to the tube. Put a weight on the patch for about 15 minutes until the patch has had a chance to dry. It can then be used and the heat generated in the tire in running will firmly fix the patch to the tube. In hot weather at high speeds on tires over 3 inches in diameter, the no-cement or as it is familiarly known, the gas patch, cannot be counted on to last. They vary enormously and seemingly without reason. Some have stood the wear and tear of thousands of miles, others seem to slip off the puncture as soon as the tire becomes hot.

Vulcanizing on the Road

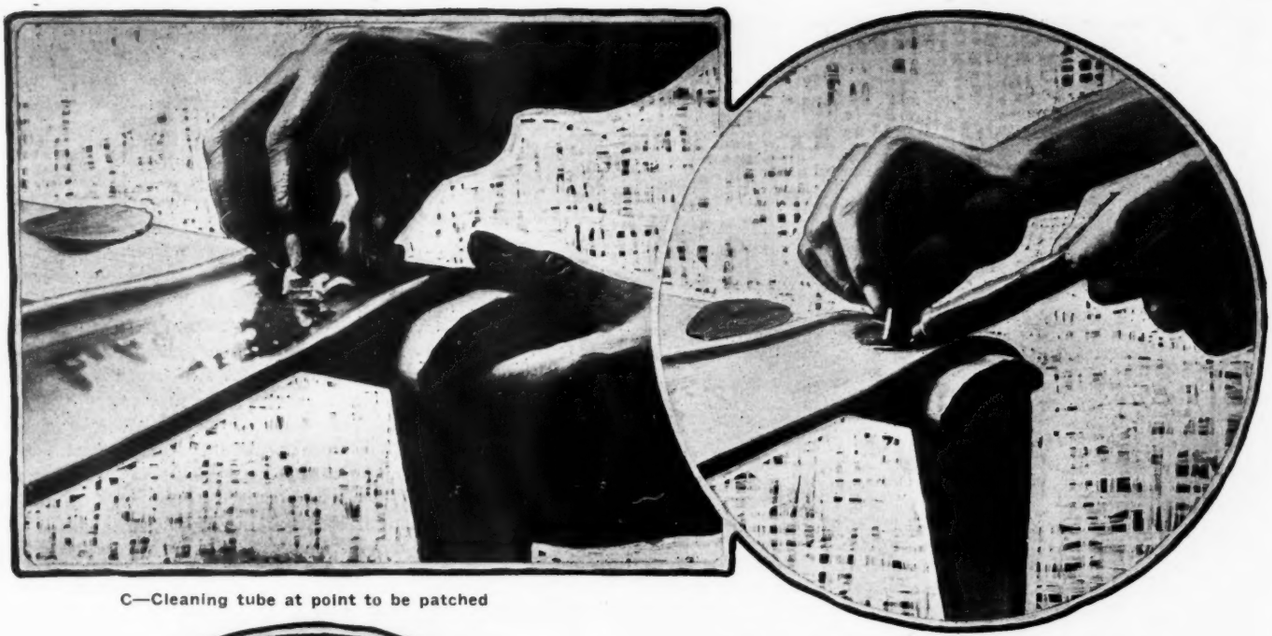
There is a growing tendency for the tourist to carry a portable vulcanizer. Holes too big to be patched can be mended without difficulty. Instead of the more or less temporary repair made by a patch, a permanent cure is effected by the use of the vulcanizer. A tube con be completely vulcanized in 20 minutes.

The use of the gasoline portable vulcanizer is simple. The tools required, outside of the vulcanizer, consist of an ounce gauge, shears, emery cloth, prepared rubber and cloth. The entire outfit weighs about 3 pounds. The steps to take in making a

Rolling wheel over freshly applied patch



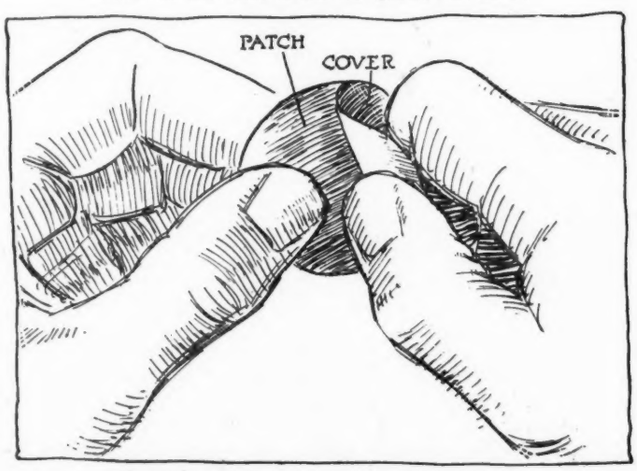
What to do with different types of leak



C—Cleaning tube at point to be patched

D—Applying the cement before laying patch

Don't let the tube touch the ground as above



Removing the cover from a no-cement patch

small repair are easily followed and the operator is satisfied in knowing that the tube is as strong at the point where the repair was made as at any other point.

Roughen the surface of the tube for a space of about 2 inches all around the puncture with the emery cloth. Next, wash the roughened surface thoroughly with gasoline. A piece of the prepared rubber large enough to cover the puncture is cut off and the surface to be applied to the tube is dampened with gasoline and then allowed to dry thoroughly. The prepared rubber is then laid over the puncture and the vulcanizer is clamped in place. The thumb screws are turned up tightly after the repair has been centralized beneath the vulcanizer. When this has been done the vulcanizer with the tube in it is laid on a level foundation and the ounce measure of gasoline filled and poured in.

Vulcanizing Takes 15 Minutes

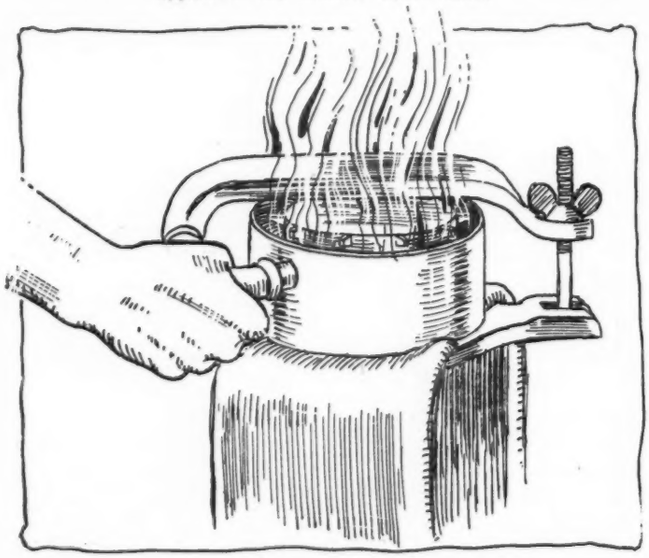
Everything is now in readiness to apply the match. Note the exact time and ignite the gasoline. It should burn exactly 11 minutes. The tube is left in for 4 minutes more. If it is allowed to remain more than 2 or 3 minutes over this time an overcure results and the patch is spoiled. The total time from the moment the match is applied to the time that the tube is removed should be between 15 and 18 minutes. After the flame goes out the ribs of metal within the vulcanizer retain the heat long enough to complete the vulcanization.

Portable steam vulcanizers are easily used and give excellent results. They use gasoline or alcohol for fuel in the same manner as the type described above. In addition to the directions for the preparation of the inner tube, it is only necessary to fill the water vessel of this type and to apply them. The length of time for making the cure is the same. The temperature is either regulated by hand or taken care of automatically. In either case the vulcanizing temperature should never vary far from 265 degrees Fahrenheit.

Tears Should Be Vulcanized

When a piece is torn out of the tire the hole should be filled in vulcanizing by a piece of repair rubber. The rim of the hole in the rubber should be sheared off to a tapered or beveled edge and then carefully rubbed with the emery and cleaned as described above. A piece of rubber the exact size and shape of the hole is then cut and rubbed with the emery, and then cleaned with the gasoline. This piece of rubber is laid in the hole and

The use of the flap saves many a tire from burred rims. They are applied in the manner shown above



Portable vulcanizers make permanent repairs on the road. This is an example of the type used

the repair is then carried on in the same way as for a regular vulcanized patch, by placing a large patch over the hole and over the piece of prepared rubber in the hole. It must be remembered that the biggest factor in securing a good job is in cleaning the rubber thoroughly with the gasoline. Oiled paper is slipped under the cut to prevent vulcanizing the sides of the tube together.

Care Necessary in Replacing

Big tears, several inches in length, pass beyond the scope of road repairs. In general they also pass beyond the scope of the private owner and come to the hand of the tire repairmen who has mandrels for splicing another section of tire into place.

Whichever of the above methods have been used for repairing the inner tube on the road, there is still one important step left before the job is complete: getting the tube safely back into the shoe. It is at this point that the driver makes it possible to have any number of blowouts without moving a foot. Pinching the tube with the tire tool if it is a clincher is inevitable if care is not taken. It is even perfectly possible to pinch the tube with a good amount of care, if the shoe is new and is hard to fit. In prying the outside bead over the rim, the tube is often caught between the tire iron and the rim. Care is the only preventative measure.

With demountable rims a small burr on the rim is often sufficient to cut the tube. Keep the rims smooth and use flaps over them. It is better if the inner tube has no contact with the metal. Do not allow rims to rust. Keep them painted with graphite paint. This will render tire changing quicker and will prevent deterioration of the tire through contact with rust. In putting the tube back in the shoe, always see that the shoe is clean inside and that the nail or whatever caused the puncture is not still in the rubber. Always pump the tube sufficiently to round out all the kinks before putting the tire back on the rim. Do not allow tubes to touch the ground in packing them into the rim. A small amount of sand picked up this way can cause a puncture in less than 10 miles on account of the enormous friction. Powder gently with the tire talc. Do not use it copiously, or it will gather at the bottom of the shoe in putting on the tire, form a lump and materially shorten the life of the tube. It is best to powder the tube before putting it into the shoe, rather than putting the talc in the shoe where it will all run down in a heap, forming a lump.

Blowouts Big Expense Item

Blowouts through the shoe are distinguished from puncture in that the air is released suddenly enough to produce an audible sound that may vary anywhere from a whistle to a sharp report.

Blowouts can happen on a new shoe by running over some hard sharp substance that cuts through to the inner tube, or that cuts so deeply that the wall or rubber is not strong enough to withstand the pressure from within. When the blowout occurs, stop the car at once. If traveling at a high rate of speed this will have to be done carefully because the balance of a car traveling at high speed has often been destroyed under the combination of a rapid application of the brakes and a blowout tire.

After the tube has been repaired by one of the methods described above, or a new tube has been fitted, attention should be turned to the shoe. If it is an old shoe, the blowout is due to wear and the tire is probably weak in many other spots, a blowout patch will often enable the driver to take the car to a point where a new shoe can be obtained. If the shoe is new, the blowout patch will also hold until a permanent repair can be made.

There are two kinds of blowout patches, those which are held in place by their adhesion to the inner surface of the shoe by automatic vulcanization and those which are held in place by flaps between the edge of the rim and the bead.

For impending blowouts where it is desired to strengthen the walls of the shoe, the self-vulcanizing blowout patch is used.

These are applied to the inside of the shoe in the same manner in which the no-cement patches are applied to a tube. The surface of the shoe to which the patch is to be applied is cleaned with emery and washed thoroughly with gasoline. The surface of the patch which fits against the shoe is also washed with gasoline and then applied to the tire while tacky. The tube is then put carefully in place with due precautions against shifting the position of the patch and the tire pumped up. The heat generated within the tire while moving over the ground will be sufficient to vulcanize the patch in place. This type of patch can be used on cuts up to 1 inch in length. They cannot be used on a round hole at all. They are solely an emergency affair and are temporary relief against a blowout. They are not as strong as the blowout patch with the flaps because they are thinner and not so large.

Blowout Patch Saves Trouble

Many times in an emergency the driver will be driven to depend on the inside or blowout patch. This patch fits between the tube and the shoe and is composed of from five to eight plies of strong fabric. In order that it will not cut the tire at the edges it is tapered down from the center and ends in a very thin edge. On each side of the patch there is a flap that projects between the bead of the tire and the rim for holding the patch in place. When the tire is pumped up the patch is held so strongly that there is no chance of its creeping. There is no difficulty in applying this patch except that one should be sure that the flap toward the inside of the wheel is pulled as far out as possible before the outside bead of the tire is put on, otherwise it will be practically impossible to get this flap straightened out. There should be no wrinkles in the flaps. It is also a time-saving scheme to apply that part of the tire with the patch first and therefore to place the part of the shoe with the patch furthest away from, or diametrically opposite to the valve. Strap an outside patch, boot or protector over the exterior of the shoe as a safeguard. This should be done before the tire is fully inflated.

When an outside boot is strapped on after the tire has been pumped up it is impossible to draw it nearly as tight as would be possible were the boot fitted when the tire is still soft. This is apparent because in the latter case the tension in the raw hide lacing is first made as great as possible by hand and then when the tire is pumped up it is drawn still tighter by the air pressure within the tube.

Blowouts often occur when the spare tubes are exhausted and coming home on a flat tire or bare rim is an absolute necessity. When the choice is offered between the bare rim and flat shoe the owner has his choice between two evils. To come home on the rim is apt to damage and cut that part of the wheel so badly that considerable expense will be necessary to restore it to its former condition. To come home on the flat shoe means the certainty of spoiling it, and losing the amount of money represented by the value of the casing.

One Way Out of Trouble

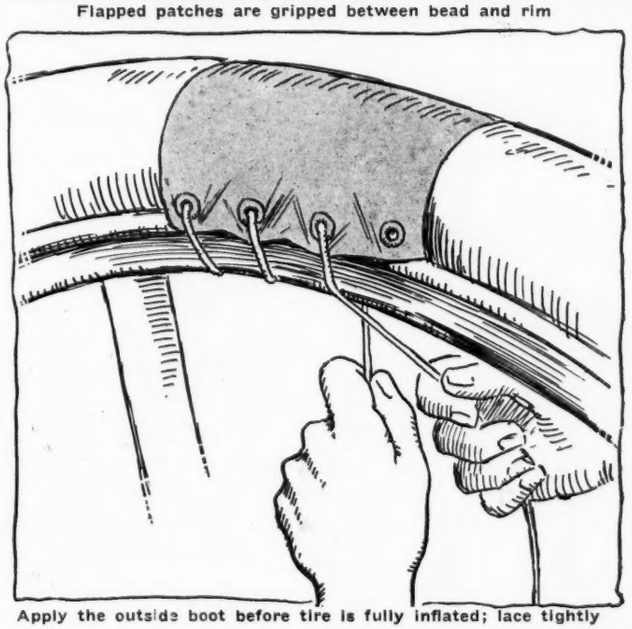
There is a way out of these difficulties if the driver is willing to put himself to the trouble of stuffing the casing with rope, rags, or any material of a similar nature. This must be done very firmly in order that the tire will be filled out sufficiently to prevent breaking down the side walls due to its running flat. Often as a base for the other packing people have used the top envelopes or other heavy pieces of cloth.

Many motorists carry large pieces of patching rubber which may be cut off any desired size and used in place of the standard patching. This method has the advantage that the patch can be made to any desired shape and accommodate nicely a three-cornered or other odd-shaped tear. The patching rubber is used the same way that the ordinary patch is used; but one feature of its preparation should be given particular attention in order that a job that will hold well will be made. In sandpapering the rubber the edge should be beveled off.

(To be concluded.)

Self-vulcanizing patches are used for preventing blowouts

Flapped patches are gripped between bead and rim



Apply the outside boot before tire is fully inflated; lace tightly

Boillot in a Peugeot, which won the Mont Ventoux hill-climb in 17 minutes 38 seconds

Breaking the Record at Mont Ventoux

Former Mark Bettered by 8 Seconds by Boillot in Grand Prix Peugeot—Entries Few—Baby Peugeots Take First and Second Places in Cyclecar Division

PARIS, Aug. 26—Entries were sparse, but the overturning of records was brisk in this year's climb to the top of Mont Ventoux, a hill 14 miles in length, with a maximum gradient of 13 per cent. and extreme altitudes of 650 feet and 6,400 feet above sea level. Georges Boillot was the star performer with his Grand Prix Peugeot. Last year, on a car indentical with the one driven by Goux at Indianapolis, Boillot established a record of 17.46. During practice this year he had shown 16.30 and 15.49 for the romp up the hill. A few days before the official climb Bablot's Delage overturned and took fire. This removed the only dangerous competitor for the Peugeot, and there was therefore no necessity for Boillot to do more than defeat his own record by a small margin. During the climb up he lost about 10 seconds on one of the bends by having to slow down to avoid a projecting cliff as shown in one of the illustrations. In addition, he gave the impression of never pushing his car to its limit. In the touring section the best time was made by Marsaglia, second in this year's Targa Florio, who drove an Aquila-Italiana up the Provençal slope in 21.52. He failed,

Marsaglia, driving an Aquila-Italiana which finished in third place, his time being 21 minutes 52 seconds. The same driver finished second in this year's Targa Florio

Boillot clearing the rocks at one of the turns by a few inches

however, by 1 second to equal the existing record. An almost better performance was that of the little Aquila-Italiana driven by Beri d'Argentina, which with a cylinder area not exceeding 2 liters (700 cubic inches) climbed in 22:58 1-5, breaking the record by more than 2 minutes.

This year, for the first time, cyclecars tackled this formidable hill. The fastest was one of the Baby Peugeot's with 31.20 to its credit. A Baby Peugeot came second and Jolibois on Ronteix third. The following are the results, together with existing or previous records for each class:

Driver and Car	Time	Existing or previous record		Class
Boillot, Peugeot	17.38	Peugeot	17.46	Unlimited
Descours, Turcat-Mery	26.48	Cottin-Desgouttes	18.38	6 lit. 500
Marsaglia, Aquila-Italiana	21.52	Fiat	21.51	4 lit. 600
Juvanon, Th. Schneider	28.17 4/5	Hispano-Suiza	24.36	3 lit. ...
Beri d'Argentina, Aquila-Italiana	22.58 3/5	Aquila-Italiana	24.56	2 lit. 700
Riviere, Metallurgique	26.42 3/5			2 lit. 700
Gaste, Vermorel	26.28 3/5	Vermorel	38.08	2 lit. 300
Casalingue, D.F.P.	26.32 3/5			2 lit. 300
Vermorel, Vermorel	31.23 3/5			2 lit. 300
Gehin, Baby Peugeot	31.20			Cyclecar
Bas, Baby Peugeot	33.43			Cyclecar
Jolibois, Ronteix	36.07			Cyclecar

Mont Ventoux stands out as the oldest, the most important and the most difficult hill-climb held in France and it now ranks as a classic, great interest being shown in the contest by the automobile public as well as the car manufacturers.

The hill is somewhat over 13 miles in length, the road sometimes winding between rocky cliffs, the maximum percentage of the grade rarely dropping below 8 after the first few hundred yards of the climb, and when the topmost slope is reached being 13. The percentages at distances of 5 kilometers are as follows:

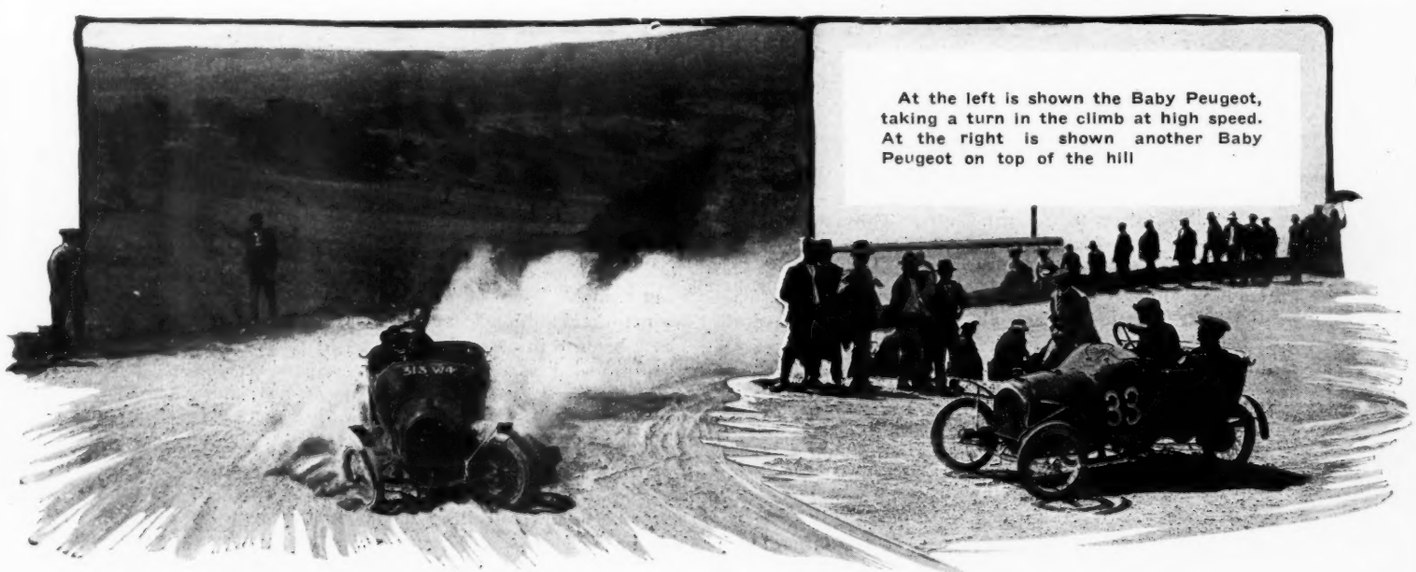
5 kilometers	5.7 per cent.
10 kilometers	9.0 per cent.
15 kilometers	8.2 per cent.
20 kilometers	8.1 per cent.
21.6 kilometers (finish)	13.0 per cent.

From 1909 to 1912 the record for the hill was held by Bablot, who, on the Grand Prix Brasier, driven by Thiery, at Dieppe the previous year, climbed the ascent in 18 minutes, 41 seconds.

This hill climb has done more than anything else to popularize the cyclecar as an all around vehicle for hilly as well as level country. These little cars when geared at 4.5 to 1 and carrying a motor developing from 10 to 12 horsepower proved themselves to be admirable for touring purposes. Their light weight and narrow track help in the hill climbing work and instead of having to follow in the heavy ruts made by the larger vehicles these little cars run between the ruts or, if necessary straddle them. By a proper manipulation of the car great advantage can be taken of the narrow tread and high road clearance which is highly important in a large car, does not become necessary.

Juvanon, who finished fourth with the Th. Schneider, on top of Mont Ventoux

Another Aquila-Italiana, with Beri d'Argentina driving, on Mont Ventoux. This car finished fifth in 22.58 2-5



At the left is shown the Baby Peugeot, taking a turn in the climb at high speed. At the right is shown another Baby Peugeot on top of the hill

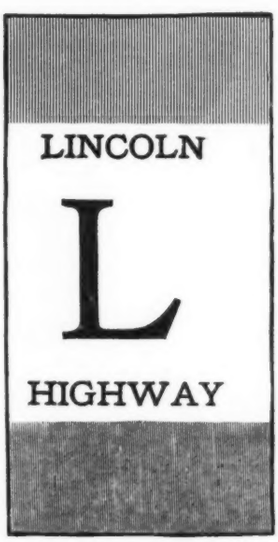
Fix Route for Lincoln Highway

Itinerary Chosen by Lincoln Highway Association Includes Pittsburgh, Chicago, Omaha, Cheyenne, with a Connection to Denver, Salt Lake City, Reno, with a Connection to Carson City, and Sacramento

¶ The reasons given by the Lincoln Highway Association for the selection of this route are: First, it has been the transcontinental line which the tourist has followed for nearly a century; second, it is considered to be the most practical as well as the most direct route so far as curves, grades and similar features of the general topography are concerned; third, it is claimed to be improved and marked with sign posts to a greater extent than any of the other routes proposed; and fourth, it will adapt itself to establishment as a national memorial highway at minimum expense.

DETROIT, MICH., Sept. 17.—The Lincoln Highway Association has issued its proclamation announcing the itinerary of this highway from New York to San Francisco. In brief, the route passes through Philadelphia, Pittsburgh, Chicago, Omaha, Cheyenne, Salt Lake City, and Reno to San Francisco. The route from Chicago west is over the well-known transcontinental route known as the Overland trail, which, with few exceptions, in the route which has been recognized as the transcontinental highway for years.

Between New York and Chicago the route does not follow one of the best known lines in that it leaves out Buffalo, Cleveland and Toledo. From New York it follows the well-known itinerary by way of Jersey City and Trenton to Philadelphia. From Philadelphia it takes in the most interesting points across the state by way of Lancaster, York, Gettysburg, Bedford, and Greensburg to Pittsburgh; from Pittsburgh it bears by way of Beaver Falls to Canton and keeping south of Lake Erie heads direct for Fort Wayne, Ind., by way of Kenton, Lima, and Vanwert. From Fort Wayne to Ligonier, the route joins the well known Chicago-Cleveland road entering Chicago through Elkhart, South Bend, Laporte, and Valparaiso. For those who do not desire to enter Chicago, the itinerary shows the route skirting to the south through Chicago Heights and Joliet where it bears north to join the standard Overland trail from Chicago to the Mississippi in through the village of Geneva on the Fox River.



Insignia adopted by the Lincoln Highway Association. The top band is red, the middle white and the bottom stripe blue

Overland Route Followed

From Geneva west the Overland trail route is adhered to, crossing the Mississippi at Clinton, and thence taking the direct route across Iowa to Cedar Rapids, Ames, Grand Junction, Jefferson, and Dennison to Council Bluffs. Through Nebraska the route follows the Platte River Valley by way of Columbus, Grand Island, Kearney, and North Platte to Big Springs at which point a southern detour to Denver is indicated, the main route, however, continuing straight west through Chappell, Sidney, and Pine Bluffs to Cheyenne where the other loop from Denver again joins it.

Across Wyoming the course leads through Laramie, Rawlins, Point of Rocks and Granger to Evanston.

The route through Utah is by way of Echo and Partley's Canon to Salt Lake City, and thence through Garfield and Grantsville to the Nevada line at Ibafah.

Across Nevada it is direct through Ely and Austin to Reno, at which point an option is given, one route bearing south through Carson City and Placerville to Sacramento, the other route further north passing through Truckee and Auburn to Sacramento. From Sacramento the route lies through Stockton and Oakland to San Francisco.

The insignia of the Lincoln Highway has b en adopted as a red, white, and blue oblong bearing the words "Lincoln Highway" above and below a large capital L on the white portion of it, as shown in the accompanying illustration. The white band is approximately three times the width of either the red or blue. This insignia should make a suitable marking for sign-posts along the route in that it will appear as three bands on the post, red above, broad white with lettering in the middle, and blue at the bottom.

The Lincoln Highway Association advances several reasons for the selection of this route. First, for nearly a century it has been the transcontinental line that the tourist has followed; second, it is considered the most direct and practical route so far as grades, curves, and general topography is concerned; third, it is claimed to be improved and marked with sign posts to a greater extent than any other route; and fourth, it is capable of being established as a suitable memorial highway at the least cost.

According to the present plans $10,000,000 will be required for the completion of this work. In May of this year the auditor's report showed in all 136 subscriptions, making a total of $2,682,740. This was largely donated by automobile concerns, although some private individuals had participated. Since then the work of selling certificates of different values from $5 up has been taken in hand with real earnestness, and plans for additional funds are being pushed as rapidly as possible.

Tactless Routing Causes Trouble

PORTLAND, ME., September 6—There is a fine row going on, with talk of secession by Bangor, in the Maine State A. A. and even though it may be smoothed over yet traces of it will remain to haunt the officers for some time to come. It all came about because in arranging its map of main traveled routes the main traveled road between Waterville and Bangor was not given the same prominence as some of the others, and motorists were directed to Bar Harbor by way of Rockland and Belfast along the sea coast. This is a shorter route than by way of Waterville and Bangor which would also take in Lewiston and Augusta, the latter the State capital. The result has been that many motorists who might have gone by way of the bigger cities followed the map and so Bangor garage and hotel

men failed to get the benefit of the large influx of motorists that went to the State this Summer. This was all the more aggravating when it became known that scores of foreign cars were coming into the State every day. With the Bangor motorists, the chamber of commerce and the newspapers of that city showing resentment the breach is apt to be widened instead of healed, for the Summer is now at an end and the mistake cannot be rectified. The Bangor Chamber of Commerce has arranged to have a map printed showing the prominent roads in the eastern part of the State, but that will not do any good just now. What lent fuel to the flames is the fact that Bar Harbor is open to motorists this year for the first time, and this fact has sent thousands of motorists to that vicinity. Had the map been arranged to suit the Bangor people about all would have passed through that city. Moreover, it has been found that the road via Bangor, Lewiston and Augusta is better than along the shore.

Night scene at the street show during Made-in-Detroit week

D. W. Hoegg, of Portland, chairman of the touring committee that printed the map, in trying to assuage the feelings of the Bangor protestors wrote to Secretary Hennessey, of the Bangor Chamber of Commerce, stating that the road was not mapped out and the information put in the main portion of the book was due to the fact that it was impossible to get everywhere in time to get road information for the book, but that it will be rectified in next year's book. He states that he is now directing motorists to Bar Harbor by way of Bangor.

The Bangor business men are angry because they did not discover in time that the celebrated Maine automobile road book, as far as they were concerned, it seems, was somewhat of a gold brick. The big map in the back of the book directs motorists how to get to Bangor by way "of its back door" as one termed it instead of on the through route from Portland. By making some of the routes prominent by reason of wide blue lines and others thin black lines, motorists have been following the wide lines, for the thin lines seemed to indicate inferior routes. So the route between Waterville and Bangor being a thin black one led to the impression it might be well to avoid it.

Moreover, the map is prominent by reason of its being that showing the "Pine Tree Tour."

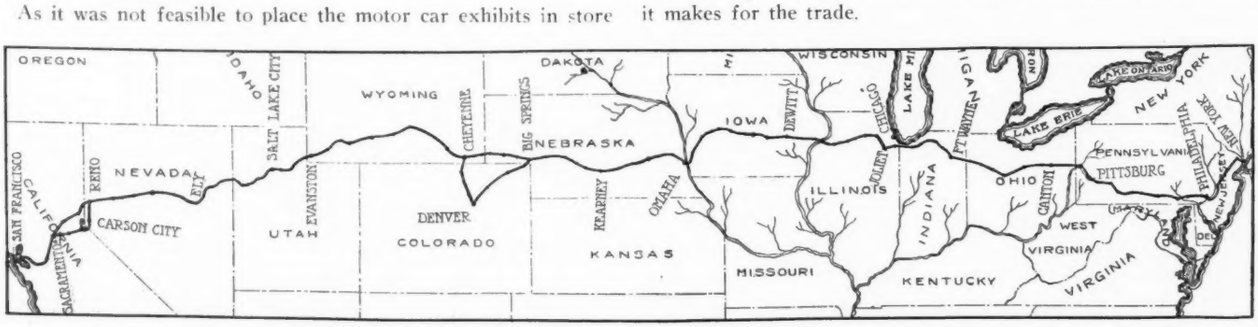
Made-in-Detroit Week Shows Many Industries

DETROIT, Sept. 13—Tonight at 11 o'clock Detroit's first exhibition of local-made products comes to an end after a most successful week. In all of the store windows on the principal streets the many kinds of merchandise which are manufactured here are displayed, many of the exhibits showing the actual making of them. The industrial exhibition is under the auspices of the Board of Commerce and so enthusiastic has been the affair's reception that it has been decided to make it an annual event, plans even now being made for a more elaborate display another year.

Of course, the automobile is supreme in value and size among the city's industries, but the exhibition has shown that it is not the only great manufacturing work of the ever-growing city. Nearly every other conceivable line of manufacturing is carried on besides, and the affair has served a great purpose educationally in opening the eyes of the general public to the general scope of Detroit's manufactures.

As it was not feasible to place the motor car exhibits in store windows, special booths were erected to house these exclusively. They stretch along a block of Woodward avenue, the city's principal thoroughfare, between the sidewalk and the street on either side at Grand Circus Park. Each night during the week great crowds have viewed the new motor vehicles shown and the car maker's are as enthusiastic over the affair as any of the other manufacturers. No sales can be made but it gives the people an idea of what the various concerns are offering and what improvements have been made.

Sixteen Detroit motor vehicle manufacturers participated, as follows: Krit Motor Car Co., Packard Motor Car Co., Studebaker Corp., Standard Motor Truck Co., Federal Motor Truck Co., Ford Motor Co., Chalmers Motor Co., Paige Motor Car Co., Lozier Motor Co., Abbott Motor Co., Regal Motor Car Co., Briggs-Detroit Co., Century Electric Car Co., Universal Motor Truck Co., Hudson Motor Car Co., Cadillac Motor Car Co. The Fisher Body Co., also exhibited in the booths some of the bodies it makes for the trade.



Map showing the route chosen by the Lincoln Highway Association for the memorial transcontinental highway from New York to San Francisco

Float Chamber Design and Requirements

Requires Capacity for Abnormal Needs — Adequate Jet Area Is Essential — Vent Is Not Needed

By R. W. A. Brewer

EVERY modern carbureter is fitted with a float chamber the duty of which is to maintain a constant level of fuel in the instrument itself, and this device has been almost universally adopted ever since the celebrated Maybach patents were fought out in the law courts.

It is quite possible, however, to eliminate the float chamber, and several attempts in this direction have been made with more or less success, but as a commercial proposition many difficulties occur when the elimination exists. In the first place, the variation of fuel head in the tank is difficult to compensate for unless a subsidiary tank is provided, fitted with some means of regulating the flow of fuel to this subsidiary tank as the jet allows fuel in measured quantities to pass through to the engine. The ordinary float chamber can be operated in many ways, and several examples are shown in the following figures.

The first important point to bear in mind, in designing a float chamber arrangement, is that the chamber itself should have sufficient capacity in order to prevent the engine stopping under abnormal conditions, or when the fuel is not flowing regularly to the float chamber. Secondly, the area through the needle valve which supplies the float chamber must be of sufficient size to pass the necessary amount of fuel, even when the tank is almost empty and the fuel head is low.

Avoid Too Small Needle Valve

In several designs of carbureters difficulties have been experienced in getting the fuel into the float chamber, due to the needle valve being too small, and it must be borne in mind that the area through this valve should be considerably larger than the area of the jet orifice. In cases where the fuel needle is situated above the float, the fuel, on issuing from the needle valve, strikes on the top of the float. When the fuel issues at high velocity the pressure due to the velocity of the fuel acts upon the float, the issuing stream striking on the top of the float will tend to prevent it rising and thus will, in some instances, cause the float chamber to flood. In cases where the float is supported, as in common American practice, from a hinge at one side, the effect of the issuing stream upon the float is very small, as the moment of the pressure about the fulcrum from which the float swings is a very small one, and therefore its effect upon the float is negligible.

It is probably unnecessary to point out that the action of a carbureter float is similar to that taking place in the ordinary domestic water cistern fitted with a ball valve, and the float performs the same function as the ball itself, through the medium of levers or by direct connection, and closes the fuel inlet valve when the level is at a predetermined height.

In the working of a carbureter it may happen that, on account of high engine suction, the level of the fuel in the float chamber does not stand at the same height as the rest level, and it has been thought in the past that the deviation from the true level had a serious effect upon the operation of a carbureter jet. The writer considers that this is a fallacy.

If one comes to consider the small deviation that is possible in the float chamber as related to the total depression, or difference of pressure, between that of the mixing chamber and the float chamber, it will be seen that the proportionate discrepancy in the level bears a very small relation to the total depression. For example, it may occur that the depression in the mixing chamber is of the order of from 10 inches to 15 inches of water head, while the error in depression in the float chamber will only amount to a fraction of an inch, which is quite negligible.

Float Chamber Vent Not Needed

There is another point upon which the author takes the opportunity of expressing an opinion, and that is with regard to the necessity of fitting an air vent hole in the top of the float chamber. Owing to the difficulty experienced in some cases in getting sufficient fuel to pass through the needle valve of the float chamber, the writer considers it advisable not to use a vent hole in this chamber, and to allow the suction upon the jet to facilitate or accelerate the flow of fuel through the float chamber needle valve. When there is no vent hole in the float chamber this suction, of course, comes into operation, whereas when a vent hole is employed the only difference of pressure which is effective is the difference of pressure due to the head of the fuel in the tank above the needle valve of the float chamber. I have found no difficulties in practice on account of the elimination of a vent hole.

With reference to the float itself, some authorities consider that it should be a fairly close fit in the float chamber, as the proximity of its walls to those of the float chamber would assist in locating the float and prevent it moving about. Messrs. Gillett and Lehmann carried this idea still further in shaping their float as a double cone, with the object, in the first place, of retaining a large bulk of gasoline in the float chamber, and secondly, to guide the float itself, as the large ends of the double coned float were of almost the same diameter as the float chamber, thus steadying the float within the chamber. Such a shape of float is also very sensible to movement, but is largely self-damping on account of the resistance given by the conodial surfaces to movement in a vertical direction. This type of float, in actual practice, was arranged to rest upon a pair of small balance levers in the ordinary way, with a central weighted fuel needle having its seat downwards. With further reference to the shape of the float itself, it is important to bear in mind that in cases of hollow brass floats which are so frequently adopted in ordinary practice, there may be difficulties arising due to the difference between the internal and external pressure to which the float is subjected, and for this reason the ends of the float should not be flat but should certainly be dished or corrugated to allow for slight expansions and contractions of the air enclosed within the float. Unless these precautions are taken, leakage is very liable to set up on account of the working at the soldered joints.

Eliminate Float Joints Where Possible

In the construction of floats of this type it is well to eliminate as far as possible all joints, and a suitable float can be made from two pressings soldered together with one circumferential seam. These pressings or stampings must naturally have more seams than one in cases where the needle passes through the center of the float, or when a passage is provided for the jet, as in the concentric type of instrument In any case, however, care should be taken in the design so that the number of soldered joints can be reduced to a minimum.

In passing it may be pointed out that unless a conical seated needle is true, and is prevented from rattling or shaking, it is often liable to leak. In practice it is somewhat difficult to get the needle tight, unless grinding is resorted to, due to inaccuracies

in drilling the various holes through which the needle passes in a perfectly true line. For this reason a spherical seat is preferable as it allows a slight movement to take place without causing the needle to leak.

Concentric Float Chamber Best

There is one other point which should receive attention before leaving the subject of the float chamber, and that is the position of the float chamber relatively to the mixing chamber.

It has been the general practice in the past to make the float chamber on a different center line to the mixing chamber and the two situated side by side. When the carbureter is placed in position on the car, the float chamber may be either at one side of the mixing chamber or in front of it or behind it. There is a certain amount of importance attached to the position of a float chamber which is not on the same center line as the jet, as it will be seen that as the car ascends a hill, when the float chamber is in front of the mixing chamber the tendency is for the jet to receive rather more than its normal supply of fuel, which is convenient. Conversely, on descending a hill the inclination of the car retards the flow of fuel by reason of the difference of the two levels. When, however, the float chamber is placed to the rear of the mixing chamber, the reverse takes place, which is not a desirable feature.

Probably the best system is the concentric system where the float chamber is below, and the float itself surrounds the jet, as in this case the relations between the level of fuel in the float chamber and in the jet orifice are always the same. Furthermore, it makes a very convenient manufacturing proposition, and the carbureter generally is of much smaller dimensions than when a separate float chamber is employed.

Concentric Float Reduces Length

The concentric arrangement reduces to a minimum the length of the fuel passage to the jet and consequently inertia effects are reduced in the fuel stream.

A concentric carbureter lends itself to universal fitting, as by a simple means the air and fuel openings can be set in any desired position relatively to one another.

An important point arises in the attachment of the fuel pipe to the float chamber and it should be such that the bulk of the vital parts of the carbureter, such as the float and needle valve, also the jet, can be removed without making any disconnection of the fuel union.

Increasing the Number of Cylinders

THE single, two, and three-cylinder engines may, so far as the standard touring car is concerned, with truth be said to have passed away. They have played their part on the stage of motor progress and will be seen no more. Today no one thinks of anything less than a four-cylinder, though some aspire to sixes and eights. It has taken a long, long time to establish the four-cylinder, yet the effort to do so has been well worth the time and trouble devoted to it. The up-to-date four-cylinder is a wonderfully efficient engine, and in saying this the writer is using the word "efficient" in its general sense and taking *all* the factors that affect the question into consideration.

A well-designed four-cylinder of the latest monobloc type is not appreciably a larger engine than an old type two-cylinder of considerably less power, and this economy of space is certainly not the least of the features which have made for the success of the four-cylinder. If we consider this engine solely from the point of view of simple construction it must be granted that it represents the practical ideal as compared with every other design working upon the same primary principles. The writer is not discussing this engine from the point of view of a two-cycle engine or a rotary engine advocate.

The point at issue is whether a general increase in the number of cylinders is probable or desirable. Indications are not wanting that the merits of sixes, eights, and quite possibly twelves will ge exploited in the immediate future. The writer contends that, so far as the engine manufacturer is concerned, it is the four that they would prefer to make, for the simple reason that it lends itself admirably to such up-to-date workshop processes as make for accuracy and rapidity of construction. One might instance the crankshaft with its four-throws all in the same plane and compare the machining of this with the six-cylinder crankshaft. Again, take the case of the single block of four cylinders as compared with the two or three sets of the six. It cannot be questioned that the advantage in construction is with the four, and this is made plain in the relative cost of a four and six cylinder. We do, in fact, today get quite well made, though not necessarily highly finished, fours at the price of a high-class single of, say, six years ago. On the other hand, the six is only found on the most costly cars, although there are one or two of what might fairly be called moderately-priced sixes, but, taking the six as a type, it is a distinctly expensive engine, and it is not clear how, even were its advantages much more marked than they are, it is to compete with the four.

True, there is something in the practically perfect balance, evenness of torque and rapid acceleration of the six, but to the vast majority of car users would these advantages be noticeable as against the four? The writer does not consider this would be the case by any means. It is not proposed here to enter at all into the merits of sixes, eights and twelves, but the writer's object is rather to obtain some expression of opinion as to whether the four has not shown itself to be, when all factors are considered, the limit of the number of cylinders desirable. It was never in doubt from the earliest days that the singles, twos, and threes would be supplemented, but although theoretically it would be possible to go on adding as many cylinders as a chassis could be made to accommodate there is obviously no economic limit, and the writer contends that this is obtained in the four.—H. in *The Motor*.

Stresses Equalized in Chain Drive

Formerly when chains were used on touring cars the differential was accommodated in an extension of the gearbox and the box itself was supported partly by the differential shafts. This form of construction provided a most difficult assembly in that it had to be truly in line in three planes and any whip of the frame caused bending of the differential shafts which according to their magnitude might or might not cause a permanent deflection in the shafts. This form is seen in but few instances now, such as the Berliet and Benz, most others having the differential housed in a separate casing and affixed to the frame by the housing, thus relieving the shafts of all stresses other than the torque due to driving or braking. It is hardly necessary to mention all the advantages of this design as they will be fairly obvious. In quite a large number of chassis the same axle that is used as a live axle on pleasure cars or lighter trade vehicles is employed, without the spring tables and brake brackets, as the differential casing carrying the shafts on which the chain sprockets are fixed. To quote an example, the Adler chassis is fitted with the same differential and case that forms the live back axle on the 40 horsepower touring car. By taking the drive through a shaft provided with universal joints from the gearbox to the differential, any whip in the frame will not throw a stress upon either of the transmission casings or any of the driving shafts.—From *Internal Combustion Engineering*.

The Engineering Digest

Valve Safeguarding the Feed of Oxygen From High-Compression Bottles—Why Germany Has Doctor-Engineers—Fuel Pumps in Bellem Kerosene Motor

Fig. 5—Burned-out pressure-reducing feed valve from oxygen bottle

SINCE the use of compressed oxygen for industrial purposes reached the practical importance which is due mostly to its employment for the cutting of metal, for autogenous welding and for cleaning out carbonaceous deposits in the cylinders of automobile motors, the reducing-valves in the bottles in which the oxygen is stored under high compression, or in the conduits through which it is taken to the work, have been subject to disturbing and destructive factors which rarely, and only to a small extent, interfere with the operation of the much smaller oxygen apparatuses used for medicinal and laboratory work.

For all purposes oxygen is sold in the market in steel bottles under a compression of 150 atmospheres, and this high pressure is reduced at the place of consumption to the desired working-pressure by means of an accurately adjustable throttling-device in the reducing-valve. The gauge-pressure, and therefore the amount of gas furnished per minute, must remain constant without readjustment so long as there is more than working-pressure left in the bottle. How this requirement is met appears from Fig. 1, representing the reducing-valve turned out for autogenous welding and metal-cutting purposes by Drägerwerk Lübeck.

The reducing-valve is secured to the stopcock C of the bottle B by the union nut A. When the hard-rubber stopper D is turned up by means of the handwheel E the compressed oxygen is let out as far as to the hard-rubber piece L, passing through the screen J where impurities are retained. On the pipe-end G is mounted the so-called finimeter F which indicates the pressure and thereby the content of the bottle. When the bottle is not in use, a spring presses so hard against the hard-rubber piece L that no gas can escape, but when it is released, by means of the adjustment screw R, the spring U and two intermediate levers, the gas enters in the valve housing Q. By opening the valve H it flows to the place of consumption through the tube O which is secured by wingnut N. The pressure within the housing Q takes effect on the rubber membrane T and thereby affects also, on one side, the spring U and, on the other side, the system of levers, with the result that the throttling at L is kept balanced to produce the exact flow corresponding to the working-pressure to which the apparatus has been adjusted. This pressure can be ascertained by the manometer M. If excessive pressure arises by reason of faulty adjustment the safety valve S blows off.

An apparatus of this kind must of course be strong enough to resist the pressures to which it may become exposed, and if, for any reason, it becomes possible that the whole pressure from within the bottle may be applied to weakened parts of the reducing-valve, explosions of considerable violence may occur. At the technical school at Winterthür, for example, a mechanic was killed a few years ago by such an explosion, several pupils were seriously injured and the building was badly shaken. By investigations following this and other accidents it was established that the presence of fatty and other easily ignitable substances adjacently to highly compressed oxygen may cause a spontaneous combustion which under certain conditions may extend to the metal parts, and these may then be so weakened by the melting and burning of the walls that the whole valve is disrupted. The same phenomenon gave the manufacturers of Diesel motors occasion last year to issue an insistent warning to their customers and installation-engineers cautioning them not to use compressed oxygen for starting a repaired or new motor if the air compressor failed to do so, giving as the reason that violent explosions would occur where the oxygen came together with fatty lubricants.

The result of the investigations was that unsuitable lubricants and packings were carefully avoided. Glycerine was substituted for oil and fiber for leather, but, as the explosions nevertheless did not cease, the explanation was sought in very high pressures supposed to arise at the hard-rubber piece by the sudden opening of the bottle—and to exceed that existing in the latter—and in the assumption that particles of metal were carried along in the stream of gas, were ignited by the high velocity and in turn ignited the hard-rubber stopper.

As now proved by the results of experience, the reason for the trouble is more correctly explained in a somewhat different manner, which is readily understood by reference to Figs. 3 and 4. Fig. 3 showing the older construction with the use of which the trouble might arise and Fig. 4 the corresponding parts to-

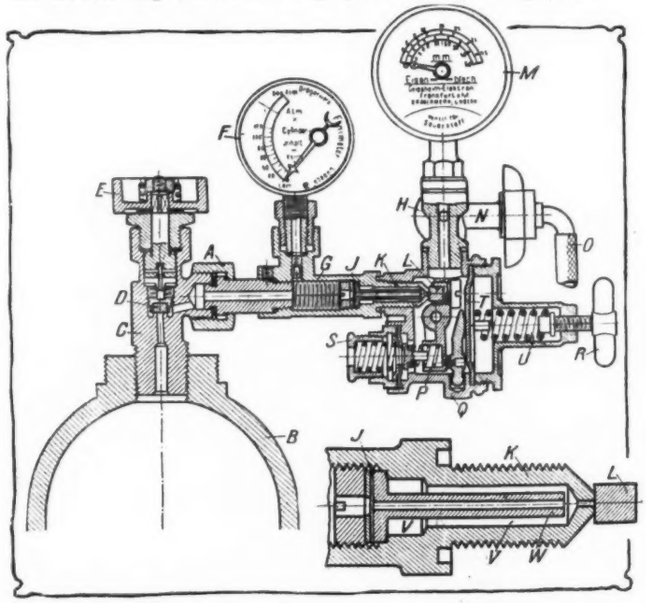


Fig. 1—Construction of reducing-valve with pressure gauges used with oxygen bottles. Fig. 2—Detail of the latest improvement, which obviates explosions and self-ignition of valve parts

gether with the improved feature by which the trouble has been obviated. Fig. 2 shows the improved feature more in detail.

The cause of ignition is found in this that, when the bottle F, Fig. 3, is opened suddenly, the low-pressure gas left between the stopcock *g* and the hard-rubber stopper *d* is adiabatically compressed, as by a piston, by the high-pressure gas which is shot out of the bottle and is thereby considerably heated, and that this heating occurs in the presence of oxygen and immediately before the hard-rubber piece where but little heat can be conducted away. All conditions for causing the ignition of the hard rubber are thus materialized, practically on the same principle which is utilized in pneumatic igniters, excepting that the stream of oxygen from the bottle takes the place of the solid piston.

The temperatures which arise at any given pressures can readily be calculated. A volume of gas at atmospheric pressure to which a sudden pressure of 80 atmospheres (the average pressure in the bottle) is applied and which is therefore compressed to 1/80 of its original volume is thereby raised 719 degrees in temperature centigrade. An experiment shows this plainly. If a copper tube 40 centimeters long and of 4 millimeters inside diameter is closed at one end with a hard-rubber stopper and the other end is connected directly with the stopcock of an oxygen bottle and then the stocpcock is suddenly opened, the stopper will burst into flame in from 20 to 40 seconds. The larger and rougher the exposed surface of the rubber stopper is and the less there is of heat-conducting material adjacently to it, the more quickly the inflammation will take place. That the explosion resulting from the concurrent expansion of combusion gases does not take place at once is understood by an examination of hard-rubber stoppers used for the experiments. They show a central portion which is burned out hemispherically while the circumferential portions are much less affected, because here the heat is carried away to a greater extent through the copper tube and other metal in which the stopper is secured. The ignition must thus be a gradual one starting from the middle of the exposed surface of the stopper.

Other experiments have been conducted with complete reducing-valves and the result of the auto-ignition of one of these is shown in Fig. 5.

The remedial construction devised by the Lübeck concern on the basis of these experiments and shown in Figs. 2 and 4 removes all danger of explosion. The method consists in leading the heated air or gas which with the older construction was compressed between the outrushing column of gas and the exposed surface of the rubber stopper, into an annular chamber V formed by placing a tube *i* in the manner shown in the high-pressure channel in front of the hard-rubber stopper. Forced into this chamber the heat caused by the compression becomes innocuous and is rapidly conducted away through the surrounding metal parts. This arrangement is so much more interesting and indispensable for safety as, so far, no incombustible substitute for the hard-rubber stopper in the reducing-valve has been found. [Where safety against explosions and the burning-out of the metal has been accomplished in a measure by using oxygen bottles operated with much lower compressions than 150 atmospheres, the importance of the improvement lies of course also in rendering practicable the higher pressures and thereby greater economy.—Ed.]—From article by Karl Bauer of Hannover in *Werkstattstechnik*, August 15.

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AT the end of the 19th century the Technical Highschools of Germany were empowered, after much debate of the question during the preceding decade, to accord academic degrees to engineers, giving the Doctor-Engineer equal standing with doctors in Science, Law, Medicine or Philosophy. According to *Technik und Wissenschaft* for June, where an article is devoted to the influence of Kaiser Wilhelm for the rapid advancement of technical knowledge, the change has brought many high capacities to embrace technical and industrial work who would otherwise have gone into other channels, and the lower grades of workers have been stimulated toward higher attainments, the results being, on the whole, very beneficial for substantial progress and for the avoidance of waste by misdirected efforts.

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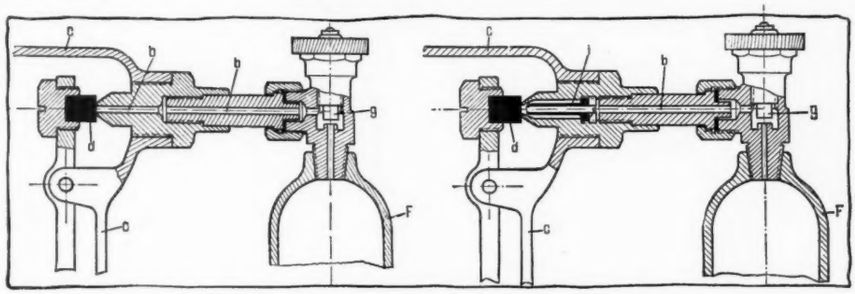
COMPARING the most advanced automobile motors with the rotary aviation motors, a contributor to *l'Aerophile* of August 15 calls attention to the fact that the consumption of lubricating oil was not under restriction at the recent automobile



Figs. 3 and 4—Comparison of old and new design of feed valves for highly compressed oxygen

races, and he argues, that, therefore, the superiority of the automobile motors on the point of fuel economy was not demonstrated. The small consumption of gasoline in the racing cars might have been due in part to profuse lubrication, on the theory that the excess oil reaching the combustion chamber largely in the form of a spray, would contribute to the power of the motor exactly as any other hydrocarbon does in a Diesel engine. He proposes that in future races, if it is the intention to furnish actual proof of the fuel economy, the consumption of oil should be restricted and controlled just as severely as that of the gasoline or other fuel (benzol) which is recognized as such.

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Four-Cylinder Pumps in Bellem Motor Which Render Starting From Cold With Kerosene Possible

IN the Bellem & Brégéras light and high-speed kerosene and heavy-oil motor which can be started by the turning of the crank and without preheating or priming with gasoline and whose prominence as an exhibit of interest among agricultural motors was referred to in these columns last week, the pump mechanism for injecting the fuel takes the place of a carbureter, and it is this feature which mainly distinguishes the motor from standard automobile motors and at the same time renders operation with heavy fuels practicable. The other features of special interest are the pulverizer-valve which is automatic and admits a small amount of air with the fuel at the beginning of the induction stroke (described and illustrated in THE AUTOMOBILE of March 20) and the timing of the admission valve, which is arranged not to open until the piston is close to low center and then to admit the air with a rush. [How the very short inlet valve cam which would seem to be necessary with this construction can be reconciled with high motor speeds is not explained; probably the stroke is very long and the speed claimed refers to piston speed only and not to the number of revolutions.—Ed.]

The pump mechanism comprises one pump for each cylinder and is shown in transverse and longitudinal sections in Figs. 6 and 7, as used for a four-cylinder motor. The piston 1 which is operated by eccentric or cam is prolongated into a stem 2 which is the plunger operating in the pump cylinder 3 with stuffing box 4, and the latter is lined with compressed cork shavings 5, which substance has been found to resist wear very well. The

end of the pump cylinder is conical and abuts against a conical seat 6'. A check valve is represented at 7. The guide 8 of the upper piston 1 can be moved up and down by means of the pinion 9 which is controlled by hand or by a governor.

When the pump cylinder rests on its conical seat 6' and the guide 8 is at the bottom of its range of adjustment there is a play of about 1 millimeter between the guide and the stuffing box 4. [The illustration does not show the minimum play.] In the cylindrical space 6 there is maintained a constant level of fuel-fluid by the method usually employed for this purpose, the kerosene being piped from a single float chamber.

When the plunger 2 is at the bottom of its stroke and moves upward, the pressure and adhesion of the cork between the plunger and the stuffing-box first of all takes the pump cylinder along until it abuts against the lower end of the guide 8. Fuel is thereby admitted at the lower end of the pump cylinder which is raised from its conical seat, and the rest of the piston stroke serves to fill the cylinder up to the end of the plunger. At the downstroke the conical joint is again closed and the fuel is driven out into the channel leading to the pulverizer-valve.

If the guide 8 is raised until the play between the stuffing-box and the guide becomes equal to the stroke of the piston, the pump cylinder is evidently only moved up and down with the piston and there is no action to drive the fuel in or out. In the intermediate positions of the guide the amounts of fuel driven into the pulverizer-valve are correspondingly reduced. The fuel charges sent to the motor can thus be regulated to a nicety.

The four pinions which regulate the position of the guides in a four-cylinder motor are all controlled by the handle 10, Fig. 6, and connected with this is the regulation of the air. [It is not stated how the air is regulated; perhaps by a longitudinal movement of the camshaft and oblique cams causing a variation in the timing of the induction valve opening.—Ed.]—From *L'Auto*, August 30.

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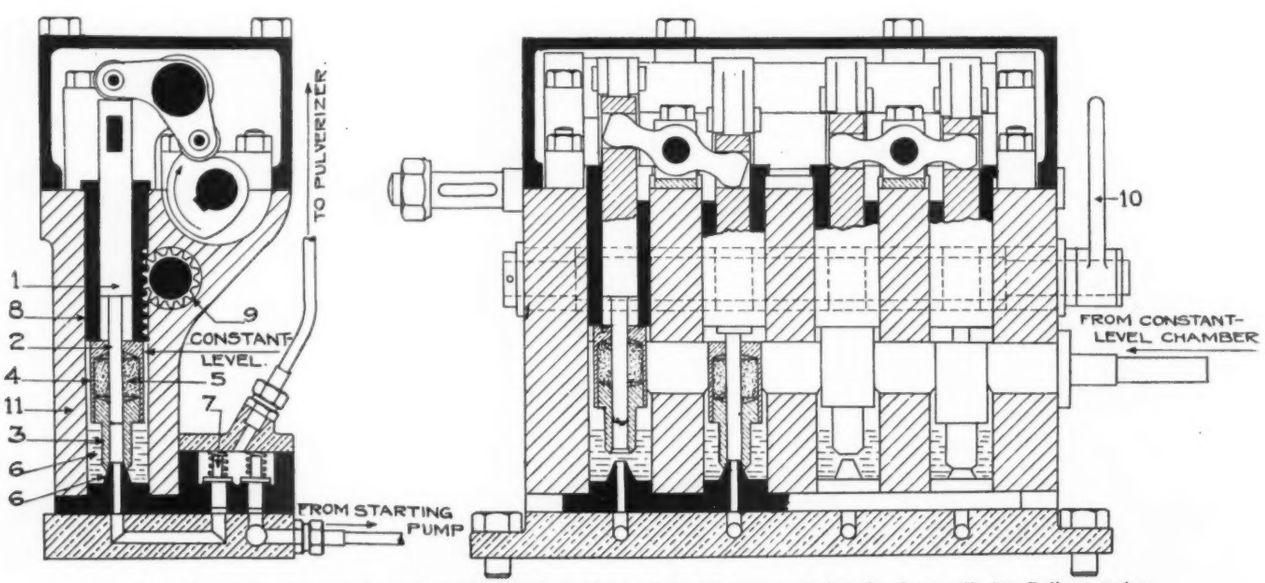
Construction Features in Cars Which Cause Excessive Wear and Early Blowouts of Tires

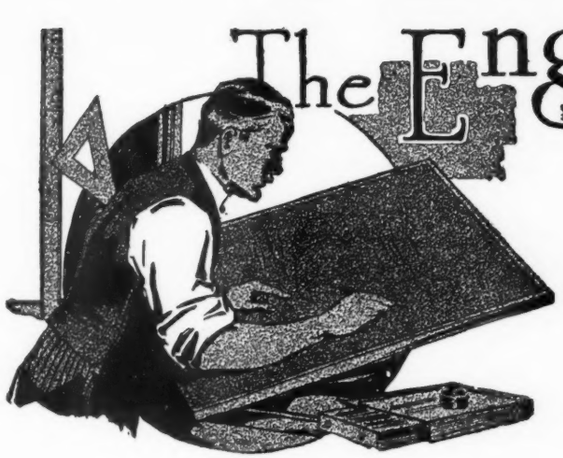
FOR a couple of years a car owner in France was confronted with the fact that his front tires regularly gave out—usually blew out—after serving for 700 to 800 miles less than the rear tires, although the situation should have been the reverse. None of the remedies suggested to him by others proved of any avail, though all were tried, until one day he noticed that the front wheels wobbled a little although the wheels and axles were parallel and no play was discoverable in either the tie-rod or the steering-gear. The latter was irreversible. It then occurred to him to charge the peculiarity up to the front springs which were very flexible. He had an additional leaf inserted in each of them, in September 1912, and the mileage made by the front tires which were fitted at about the same time has already exceeded the average of his previous experience by about 2,000 miles, while one of the rear tires has given out. It is now the conviction of this extensive automobile traveller that three reasons—all relating to the construction of his car—were responsible for the excessive wear of the front tires of which he was previously the victim; first, the excessive flexibility of the front springs; secondly, the irreversibility of the steering-gear and, thirdly, certain proportions in the relations of the right front spring to the steering-rod and the steering-arm which aggravated the effects of the two first-mentioned factors. When the flexible spring was compressed and thereby flattened, the axle was pushed back and with it the end of the steering-rod, but as the steering-gear was irreversible, the steering-rod could not really be pushed back except against the strong resistance of the emergency-springs contained in it, and the actual result was therefore always a small turn of both front wheels every time the vehicle spring on the right side of the car was flexed. Though he remedied only one of the three factors at fault—by reducing the flexibility of the spring and thereby the curve described by the axle—the reduction of tire wear was phenomenal.

The same observer holds that any form of rigid push-and-torsion strut, especially of the type which is forked in front, causes a great deal of wear of the rear tires by preventing all lateral displacement between the axle and the chassis. "Follow on the road," says he, "behind a vehicle which runs at a speed of 35 miles per hour or more and you will be astonished to notice, if there is no dust to obscure the vision, how many and large are the separate movements, now of the chassis and vehicle body and now of the wheels and axle, which take place in all directions. These movements escape the attention of those sitting in the vehicle, as they have no means for observing them directly, but they argue strongly for introducing a flexible element in the lateral relations, as may be done most simply by driving through the springs."

Cooling by the thermo-syphon system, though so much in vogue, must also be responsible for considerable tire wear, in front, since the 15 gallons of water required for a 20-horse-power motor with this system and the extra weight of a radiator strong enough to support this liquid load must make a considerable difference in the load upon the front wheels, as compared with the 2 gallons which are all that is required if a pump and an efficient radiator are used under otherwise similar conditions. —From *Omnia*, August 30.



Figs. 6 and 7—Transverse and longitudinal sections of kerosene pump for the four-cylinder Bellem motor



Shock Preventer Is Real Requirement

Only a Matter of Resilient Suspension and Elimination of Periodic Vibrations and Excessive Rebound

PITTSBURGH, PA.—Editor THE AUTOMOBILE:—I have read with interest the digest of the experiments and conclusions of Herr Erich Bobeth in regard to the spring and tire action in motor vehicles appearing on pages 298 and 299 of the August 14 issue of THE AUTOMOBILE.

As is now pretty well known, George Westinghouse has for some years made a close study of this same subject, but the conclusion he reached is somewhat different. Herr Bobeth's conclusion is that the creation of a suitable shock **absorber** is of the greatest importance. Mr. Westinghouse's conclusion was that an effective shock **preventer** is the thing to be desired.

Shock prevention is only a question of sufficient resiliency in the spring suspension and the elimination of periodic vibrations and excessive rebound.

Mr. Westinghouse therefore directed his efforts, not in the line of hampering the normal spring action, but of augmenting it. To this end he interposes between one end of each of the four steel springs and the frame of the car a telescoping chamber charged with compressed air. One member of this telescoping chamber is attached to the frame of the car, and the other member is connected to one end of the ordinary steel spring.

This telescoping chamber or air spring has a possible movement of six inches, and since the axle of the car is attached at approximately the middle of the steel spring there is a possible relative motion of three inches between the axle and the body of the car wtihout taking the flexure of the steel spring into consideration at all. The telescoping chamber also contains a quantity of oil for lubricating purposes and for adjusting the volume of the compressed air by which means the characteristic of the air spring may be varied at will. Naturally the mechanical details of the construction have been carefully worked out to prevent leakage of air and oil, but the exact nature of these details is not pertinent to the present discussion.

The steel springs and the air springs have widely different periods of oscillation, and on this account no periodic vibrations can be set up in the system. **The only really scientific and effective method of damping vibrations in a spring system is to have the system composed of two elements with different natural periods of oscillation.** The use of friction devices for damping vibrations in a spring system is illogical for the reason that in the endeavor to prevent the spring from doing what it ought not to do they hinder its doing what it ought to do.—H. E. LONGWELL.

Modern Cars Lack Unity of Design—Duryea

SAGINAW, MICH.—Editor THE AUTOMOBILE:—The modern automobile lacks unity of design. This condition has been brought about by so many additional parts having to be added more or less on the spur of the moment, such as starting units, battery charging outfits, electric gearshifts and other devices. It is seldom that one is seen which has been developed as a unit. Ford, for example, furnishes a magneto that comes within this classification. The other makers attach the magneto, require extra bearings, extra gears, extra supports, and do not obtain the high-speed sudden break of the magnetic flow that Ford gets. On this account Ford should be able to give much easier starting and much better results, and doubtless could if his magneto were fully perfected.

The design of the motor vehicle has largely been influenced by the space at hand. The natural and original tendency was to put the motor as near to the work as possible, namely, at the rear. You will think of many of the early cars like the Pierce Motorette which did this, but larger motors and larger gearsets required more room and gradually forced the motor farther away from the rear axle until it is now at the extreme end of the structure, which unquestionably requires heavier framing, greater weight and higher cost than if it could be placed at the rear where it belongs. When you have thought of this a little you will see why we are trying to get the entire power plant into the simplest possible form and at the rear where it should be.

We have not attempted to accomplish the starting of our small engines by power, but there is no reason why a magneto in the flywheel cannot spark, light and start, and it would certainly make a very simple arrangement.

Whether the electric or pneumatic gearshift will come into use or not is a question. You know the fate of the Sturtevant Mill Co.'s centrifugal gearshift which was shown some years ago at the Boston shows. This took care of the engine perfectly, but the maker could not find any one to put it on the market.

Probably the public would be more receptive at this time. It is almost impossible to get them to take up a thing, no matter how good, unless they are in the mood.—CHAS. E. DURYEA. Duryea Motor Co.

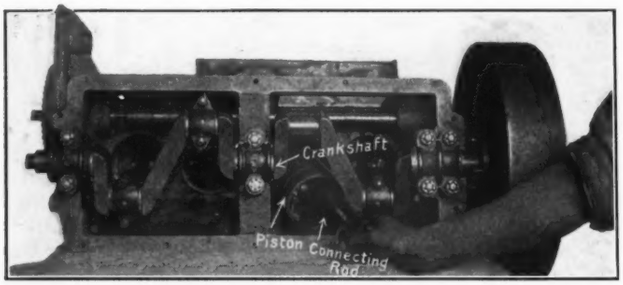
High Pressure Unwise on Poor Roads—Goodrich

AKRON, O.—Editor THE AUTOMOBILE:—There is no adverse argument against the theory that tires running on smooth roads can be inflated to very much higher pressure with safety than tires traveling on rough roads.

It has been our aim in the establishing of inflation pressures to allow approximately 8 per cent. deflection under a given load. By this is meant that the section of the tire beneath the load is increased in width when inflated to our recommended pressures, which are as follows:

Size, Inches	Lbs.	Size, Inches	Lbs.
3	50	5	80
3	55	5½	90
4	65	6	100
4½	70		

No doubt high pressures are desirable on good roads, but failures would result on bad roads.—THE B. F. GOODRICH CO.



The Rostrum

Frictional Heat Increases Tire Pressure

EDITOR THE AUTOMOBILE:—In THE AUTOMOBILE for August 21, page 348, I note in your editorial under "Owners Owe Tires Care" you state that over-inflation is bad in hot weather; that it is not unusual for 90 pounds to rise to 105 pounds by the middle of a hot afternoon; with smaller tire sizes an increase of 10 pounds pressure is about the average. I cannot conceive of any ordinary conditions that would cause a tire to increase 15 pounds in pressure, especially if properly inflated. I have driven 5-inch tires and 4.5-inch tires under different conditions, and tested same, but never have I found an increase of over 5 pounds in pressure. And I know of other experiences along the same line, and I am positively sure that no 4.5-inch tire, properly inflated, under ordinary road conditions, will gain over 8 pounds at the most.

I have frequently heard drivers state that they wanted low pressure for hot weather, which I consider an entirely mistaken view of the matter, which will lead to trouble instead of avoiding it.

I also find that a 4.5-inch tire will lose on an average of 5 pounds per week in pressure, so that unless a tire is only recently inflated, no allowance need be made for hot weather.

Uniontown, Pa. ED. T. PORTER.

¶ *The rise in pressure in a tire due to an increase in heat could be measured exactly by mathematics if it were only possible to have an exact knowledge of the initial and final temperatures of the air in the tire. As it is, however, it can be very closely approximated.*

¶ *Assuming a man who is about to make a trip in a car having 34 by 4-inch tires will gauge his tire before starting on the trip he will probably find a condition of slight under-inflation in each tire. The temperature of the air within the tires will be atmospheric or the same as that of the air in the garage. If he raises the pressure in each tire from 75 to 80 pounds the small corresponding increase in temperature will be negligible. We can assume that, at this time, the temperature of the air in the tire is 60 degrees without being far out of the way. Sixty degrees Fahrenheit is 520 degrees absolute.*

¶ *If the car now goes out on hot asphalt and travels at a speed of 35 miles an hour for some distance over this asphalt or a similar road which has a temperature say of 100 degrees Fahrenheit, it is fairly safe to assume that the temperature will be somewhere in the neighborhood of 150 or 160 degrees. This is 620 degrees absolute.*

¶ *According to the law that gases expand proportionately to the increase in absolute temperature the 80 pounds pressure would bear the same relation to the final pressure in the tire that 520 degrees absolute bears to 620 or the final temperature would be* $\frac{620}{520} \times 80$ *pounds or 95.4 pounds. The increase would have been slightly over 15 pounds. If this is true of 80 pounds pressure it is even more probable that it would occur with a tire having initially 90 pounds pressure.*

Sixes Not Used Often in Racing —Will Not Displace Fours

Editor THE AUTOMOBILE:—Why do automobiles built for racing purpose, or high speed running, have four-cylinder engines instead of six?

2—Do you think that six-cylinder engines will replace the four-cylinder engines, in cars weighing from 3500 pounds upward in the future, especially seven-passenger cars?

East St. Louis, Ill. C. B. LONG.

1—Six-cylinder cars are not used in racing so extensively on account of the enormous cost required to make a special six-cylinder racing car. Sixes are quite as successful as fours for racing, as is evidenced by the fact that a six-cylinder Alco won the Vanderbilt Cup Race 2 years in succession.

2—Six-cylinder cars will probably never displace four-cylinder types. There will always be a demand for both. Sixes will probably be made in smaller sizes in this country.

Although many of the higher price cars have been made only in sixes during the past year or two and many manufacturers have announced that for the coming season they will build sixes exclusively, there will always be many makers of larger fours. The Lozier company is one example of a concern which has announced its faith in the four-cylinder type.

Overhead Valves Help Power Through Advantageous Cylinders

Editor THE AUTOMOBILE:—Please let me know through the Rostrum if, for a given bore and stroke at the same revolutions per minute, the overhead valve develops more power.

2—If so, what per cent. over the T-head and why are there not more six-cylinder cars used in racing?

Montreal, Can. R. R. S.

—As has been stated frequently in these columns, the use of the overhead valve gives a slightly more advantageous shape to the combustion chamber owing to the possibility of approach to the theoretical ideal condition of a hemisphere. With the hemispherical, or what may be termed the inverted bowl, type of combustion space the result in power exerted upon the piston is higher for a given compression than with any other type. This can be mathematically proved but may be taken for granted as true in this space. What has been considered as a disadvantage to the overhead valve motor that the valve mechanism must necessarily be more complicated and the transmitting members be longer in order to reach from the camshaft to the tops of the cylinders. Since the motion for the valve mechanism must necessarily originate at the crankshaft there does not seem to be any way of avoiding a greater weight of moving parts in the trans-

mission of motion to the valves. Owing to the quick action necessary in the valve mechanism, the inertia of these parts must necessarily be high, hence their tendency towards noisy action. It therefore becomes a matter of choice between a more advantageous combustion space shape or a more silent, lighter and simpler valve mechanism. For a given piston displacement, providing that the design is the best possible in each case, the overhead valve motor will develop an excess of power. This cannot be expressed in percentage, however, as the difference will vary through quite a range and there are no extensive experiments on the subject available to enable one to mention an average figure.

Another feature which would make a considerable difference in the output of the motors would be in the cooling arrangements which might favor one type or the other according to the skill of the designer but under ordinary circumstances would favor the hemispherical combustion space because of the less wall area through which heat could be lost to the cooling water.

2—It is difficult to state why sixes have not been taken up more excessively in racing, but the probable cause is to a large extent conservatism and economy on the part of the builders. When there was more racing six-cylinders were not built to such a large extent as they are now and hence they were not used in races. Those who had six-cylinder cars entered them and had great success. Notably among these were the Lozier and Alco. The former won several 24-hour races and the latter took first place twice in succession in the Vanderbilt Cup Race. Both these six-cylinder cars justified the statement that the six is as good as the four for racing purposes. To build a special six, however, for a race would be a very costly proposition if six-cylinder cars were not regularly turned out by the factory.

Chalmers Making Their Own Sixes

EDITOR THE AUTOMOBILE:—Does the Chalmers Company make its own six-cylinder motors for 1914? If not, what make do they use and what is the compression used in same?

St. Louis, Mo. E. H. K.

—The motors used in the Chalmers cars for 1914 are made by the Chalmers Company in Detroit. The compression is about 60 pounds per square inch.

Information Wanted on Extinct Cars

Editor THE AUTOMOBILE:—What was the price of the old Tincher and Falcon cars? Could you give a brief description of these machines? In what year and why, in your opinion, was the manufacture of these cars discontinued?

Bernardsville, N. J. S. ROEBLING.

—The Tincher car sold in 1907 for $6,500. The car was manufactured by the Chicago Coach and Carriage Co., which concern now furnishes repair parts for it. It has not been manufactured for 3 years or more. In brief, the Tincher was a 50-60-horsepower car equipped with a 5 by 6-inch four-cylinder motor, band clutch, four-speed selective sliding gear, side chain drive, 127-inch wheelbase, standard tread, .36-inch wheels and tipped the scales at 3,000 pounds. The motor was distinguished by the use of rather an ingenious overhead type of camshaft driven through bevel gearing and a vertical shaft at the front, and having but a single cam for the operation of each set of inlet and exhaust valves which were oppositely disposed in the cylinder heads. Duplicate ignition was provided, one set consisting of a standard, self-contained, high-tension magneto of foreign make, which was forward of and across the front end of the motor. Chrome-like steel was employed in the crankshaft and camshaft, while the motor valves were a 35 per cent. composition of nickel steel; the former material was also used in the front and rear axles, gearset shafts, pinions and springs, as well as the main frame, which was further reinforced by filling the side channel members with ash strips, the latter extending from the forward end of the motor to the first cross brace supporting the gearset. A peculiarity of this frame was the use of a manganese bronze casting across the forward end as an independent radiator support. The manufacture of the car was discontinued in 1907 on account of lack of business.

No information on the Falcon is available.

Babbitt Repairs Broken Manifold

Editor THE AUTOMOBILE:—It happened recently in my garage that a young man had broken the manifold on his father's car. He came into the shop one afternoon and minutely described the break to me. He asked if it could be fixed easily without bringing the car over to my shop. His father, he said, would not be opposed to buying a new casting, but if it could be mended permanently and inexpensively the lad intimated that his father would prefer to have it mended.

Having found that babbitt is a very useful material for mending breaks, and having mended split tires, broken pipes, castings and rods with this metal, I gathered my little kit of tools and materials together and went with the boy.

The break was in a nasty place—at the "Y" of the manifold about as indicated, Fig. 1. I found that the youth had tightened the bolts securely and that there was a jog of about 1/16 inch at the break, and it was this imperfect fit, the boy claimed, that caused the break.

No doubt the break could have been mended in several ways. Simple plugging with repair cement or putty or gum would have kept the air out, temporarily at least, because the plugging material would never be under pressure from the inside except in case of backfire. The aluminum solder that is now being used with considerable success, but with which I have had no experience, would probably have made the repair permanent. But I could see no reason why babbitt could not be used to best advantage, inasmuch as it permitted repair without removal of the manifold and promised to be more permanent and quicker than the other methods that then presented themselves in my mind. I therefore immediately fell to nicking the casting with a cold chisel and hammer to insure a rigid bond. Then I stuffed oily waste into the crack to prevent the babbitt from leaking in, and around the whole pipe I bound loose wire circularly and in a zig-zag fashion to reinforce the babbitt metal laterally as well as longitudinally. I then cut a strip of tin about 3 inches wide and bent it around the manifold as shown in the sketch, bending the ends and tying them together with wire as shown. I then rendered the mold leakless by puttying the sides, taking care in the meantime that the break would be well covered and bonded all around. Then I heated the casting to insure against blow holes in the babbitt and imperfect adhesion. To pour the babbitt was no trick at all, there being no obstructions to the opening of the mold. After the babbitt had cooled we removed the tin strip and putty and the finished job looked very well. It had required less than an hour.

The ring of babbitt was only about .5-inch thick and I was not positive about its strength, should it ever be found neces-

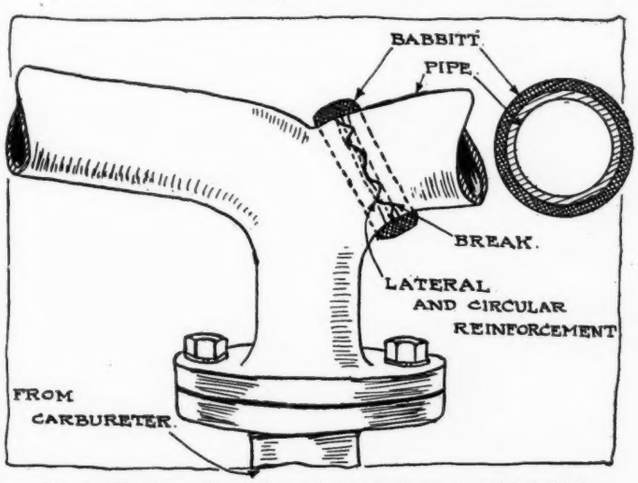


Fig. 1—Diagram of repair and manifold made with babbitt

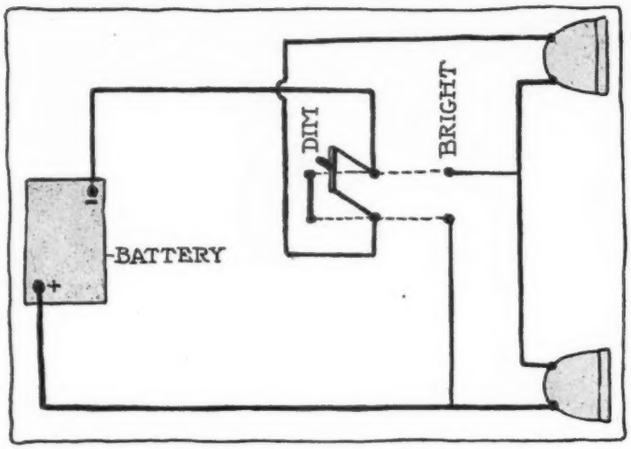


Fig. 2—Correction on Mr. Simpson's wiring diagram shown September 4 in the Rostrum

sary to remove or replace the manifold, so I instructed the boy to use extreme care in removing it should he ever find it necessary to do so, at the same time emphasizing my belief that such a time need never come.

About a month later the boy smilingly confessed that curiosity got the best of him and compelled him to remove the manifold one day just to investigate and see how well it held. He must have been unusually careful, or the joint must be fairly firm. At least, he managed to put it back safely.

Brooklyn, N. Y. W. F. SCHAPHORST.

Three Kinks for Motorists

Editor THE AUTOMOBILE:—There are three things which I have done to my car which I think will be interesting to all automobilists. I have put oil grooves in my pistons, a locking device on my brake adjustment and a stuffing box on the push rods of both a roadster and touring car which I own. These three jobs are best described by the sketches given in Figs. 3, 5 and 6.

Fig. 3 shows the bottom of the piston with a groove around it about ¼ inch from the bottom and pierced by small holes drilled on the slant, as shown in the sectional sketch.

Fig. 5 shows the lock I installed for making adjustment on the brake rod. It is similar in idea to that used on the Lozier car, although not exactly the same in detail. A turnbuckle was pierced by two holes as shown in the illustration and the lock fixed upon it so that it swung on rivets through the two holes. The brake rod is squared to take the lock which is turned down when the brake adjustment is in the proper position.

Fig. 6 shows the two methods used in installing stuffing boxes on the push rods. That on the left shows the method used on the roadster and that on the right the method used on the touring car. Both schemes will be readily understood from the lettering in the sketch.

These three little schemes filled in some pleasant time and

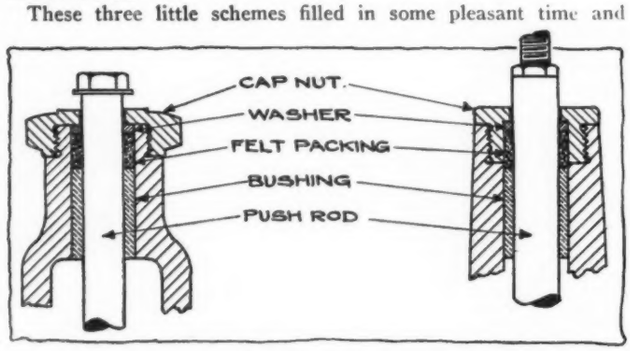


Fig. 3—Two types of packing boxes useds on push rods, which will stop the oil issuing from crankcase

each has accomplished the result desired. The first has prevented oil from working up into the motor and causing it to smoke, the second has made it easier to take up on the brakes without having to operate a lock nut and clevis, and the third has prevented the oil from working its way up past the push rods and giving the outside of the motor a dirty appearance.

New York City. J. E. S.

Submits Another Dimming Switch

Editor THE AUTOMOBILE:—I have been much interested in the wiring of headlights so as to permit dimming, as described in the Rostrum but it seems to me that the diagram contributed by one of your subscribers is not very clear.

If it is intended that two of the switch contacts be short-circuited this is not definitely indicated. However, would not the desired result be obtained more simply by the use of a two-blade switch with two contacts wired as shown in the accompanying diagram, Fig. 4?

This type of switch has, moreover, the advantage that it requires less space for operation. With the switch blades in the position indicated no current could flow through the lamps. Moving the blades into the lower position, as shown in dotted line, by means of the insulating cross-bars, so that they are in connection with both contacts, applies the full voltage of the circuit in the ordinary way to both lamps which therefore burn brightly. But in the upper position, where the lower blade connects with the upper contact, the other contact and blade being meanwhile quite free, only half the voltage of the battery is applied to each lamp, as they are then in series, and a dim light results.

Atlantic City, N. J. GEORGE GILL.

Finds Gears Too Soft

Editor THE AUTOMOBILE:—I am the agent for a certain make of car that has given considerable trouble with the gears breaking and wearing fast. On complaining to the makers that their gears are too soft (I can cut them easily with a file) they replied that because they use chrome nickel steel, it is not necessary to get a hard cased surface in order to get satisfactory operation thus permitting a tougher and stronger gear.

1—Do you believe this is good practice?

2—My experience with them is appalling and because I have invariably found all strong lasting gears impossible of being filed, do you not think this alone proves that gears should be case-hardened hard?

3.—If my principal's arguments are right then their gears should at least be tough to a blow. As a matter of fact, I can break off one of their gear teeth far more readily than a tooth on any of our competitors' gears. Now this may be due entirely to inferior stock, but I put it to you, would not harder and more thorough heat treatment raise the elastic limit of their gears?

4—Granting that their gears are too soft, is it impossible to get the case-hardened surface too hard?

5—If you answer the fourth question in the affirmative, what would be the result?

6—I surmise that the only fault possible would be that it would be too brittle and chip, but as I have not run across any such gears, I am only guessing.

7—I have often read of the heat-treating process of so many hours at a given temperature boxed up in the carbonizing compound annealing and reheating to another lower pre-determined heat and cooling in oil. Wherein do you think my people's gears fail to make good? Quality of the steel? Unsuitable carbonizing material or subsequent details as to time, temperature, etc.?

8—As this is one of the most vital questions relating to motor cars, I should like to see this letter commented upon by your readers.

9—I might mention that twenty-five gears have had to be renewed in 18 months in seven cars out of twenty bought. What do you think of that?

10—In contrast to this I am the agent of two other lines of cars over a period of 4 years and not a single gear has ever had to be renewed to date in either of those two makes.

Georgetown, British Guiana, S. A. A. STONE.

—You should not be able to make an impression on a chrome nickel gear with a file. As for knocking them off with a hammer, this might be possible with a large and sufficiently heavy hammer but should not be a very easy job. A chrome nickel steel is noted for its high tenacity, high elastic limit and good ductility. When subjected to heat treatment it becomes very hard and a file should make practically no impression on it.

Heat treatment should be used with these gears and not case-hardening. The hardness should be right through the tooth of the gear and not merely on the surface as the gear would probably chip easily under that condition. The probable cause of failure in the gears you speak of is bad heat treating and it would appear that there should be a shake up in this department of the particular factory with which you are dealing. The material if the gear is really a chrome-nickel gear would justify a greater expense in its handling.

Interested in Lighting Discussion

Editor THE AUTOMOBILE.—I have felt deeply interested in the discussion going on in your columns between the manufacturers of apparatus for lighting by gas and by electricity. I have two cars, one lighted by gas and the other by electricity, so I feel that I can look at the matter from the standpoint of an unprejudiced user.

As far as I can see both systems are satisfactory. My gas lamps are on the front of the dash just as my electric lights are and I have had no trouble with either. Were I buying a new car I would be entirely satisfied with either system.

There is one point, however, about the gas which is an unfailing source of satisfaction. I never feel the slightest anxiety about my light. I know that in case the electric wire or the lighting device should rub anywhere and be short-circuited I still have matches in my pocket and no serious harm would follow. With my lights all electric a short circuit might put me entirely out of business. Of course, with careful wiring this is improbable, but when the car is 2 or 3 years old, has had occasional overhauling (often by men whose electrical knowledge is none too good) and been subjected to the vicissitudes of many thousands of miles of pounding over the roads very unexpected things may happen to wires and batteries and you may be left stranded. With the gas all my eggs are not in one basket.

I would like to enter a protest against the knocks each side is trying to give the other in your advertising columns and would suggest, Mr. Chairman, that you rule them "out of order."

Morristown, N. J. J. S.

Oxygen Carbon Removing Good

Editor THE AUTOMOBILE:—Will you kindly let me know if the continued use of oxygen in burning carbon out of cylinders injures the motor in any way?

San Francisco, Calif. PERCY W. TREAT.

—The heat generated in the cylinder by the use of oxygen in cleaning out carbon is much less than the temperature to which the metal is subjected during the explosion of the gases while running. The method does no harm and is very quick and sure. The adoption of this method of carbon removing is certain in a large number of garages all over the country and the objections to scraping by hand are not met with when it is used.

Wants to Secure Cleveland Cylinders

Editor THE AUTOMOBILE:—I have a Cleveland car No. 1190, type H and have two-cylinders broken and can't find where to get a new one. Can you tell me where I can get it?

Houston, Tex. E. STAHL.

—As far as THE AUTOMOBILE has any record no one is dealing specially in parts for the old Cleveland cars. You might be able to secure the cylinders, however, from the Auto Parts Co., of Detroit. Perhaps some reader has a pair of these cylinders on hand.

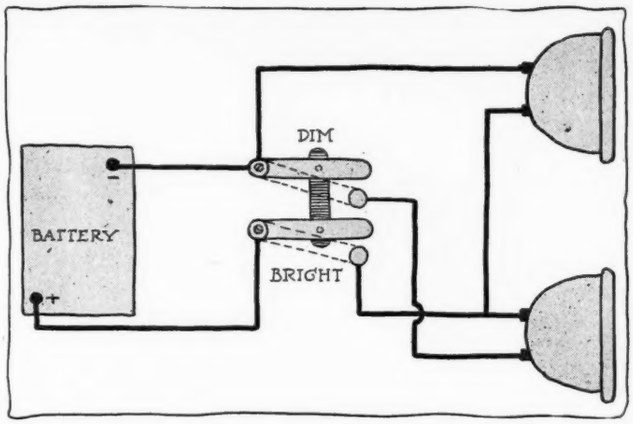


Fig. 4—Improved wiring diagram submitted to secure light dimming effect with series—parallel connection

Submits Dimming Switch Idea

EDITOR THE AUTOMOBILE:—Mr. Simpson's lights shown in Fig. 1 of the Rostrum for September 4 will not burn dim until he puts a connection across the two points on the dim side of double pole, double throw switch as my sketch (Fig. 2) shows.

Roulette, Pa. R. R. GOODWIN.

Please Sign Your Inquiries

The Editor of the Rostrum is in receipt of several letters which offer no clue to the identity of the sender because they are signed Subscriber, Reader, by initials or nom de plume. These letters are held and will be published as soon as the senders identify them. If your letter is among these you can have it published by writing this office describing the letter. If you do not wish your name to appear in the paper it is only necessary to make a note of this fact in your letter.

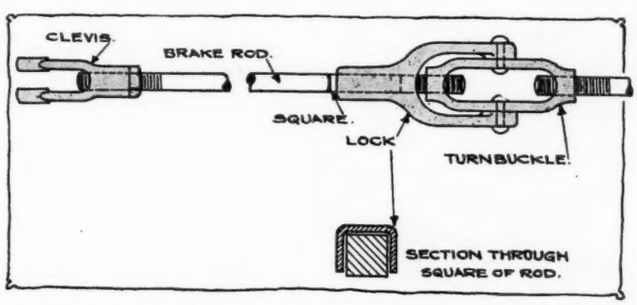


Fig. 5—Motorist's idea of method by which the brake adjustment can be quickly made and locked

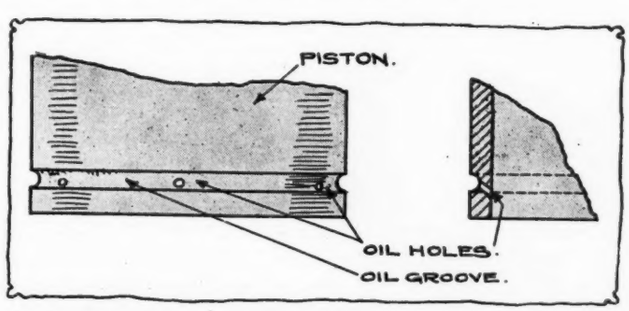


Fig. 6—Oil groove with holes cut on a slant to prevent accumulation of oil in combustion chamber

Defends Acetylene Lighting System

Representative of the Prest-O-Lite Company States That the Public Knows Very Little of Electricity—Takes Exception to S. W. Rushmore's Method of Figuring Lighting Expenses

INDIANAPOLIS, IND.—Editor THE AUTOMOBILE:—The article by J. K. Mercer in THE AUTOMOBILE for August 21 suggests a number of interesting points, in some of which I very heartily concur. I like particularly his suggestion that a complete discussion of the points brought out in my article will prove interesting to all motorists, and that the manufacturers of electric equipment might properly be expected to contribute information to this end.

Public Knows Little of Electricity

Mr. Mercer asks: "If electric lighting is not superior, why does the public demand it?" My answer to that is that the general public knows as much about electricity as a cat does of the Chinese language, and is therefore easily misinformed. It has been led to believe that electric lighting is both economical and dependable, which it is not and never can be. There is the widest possible difference between house lighting and automobile lighting, but does the public know it? Even Mr. Mercer infers that because one of the cars used in the Speedway tests did not have a magneto, it must have been an old and obsolete model. I heartily agree that a car without magneto ought to be viewed with suspicion by anyone who knows very much about ignition, but is Mr. Mercer unaware of the fact that some of the leading systems of electric lighting and starting have thrown out the magneto, replaced it by a direct current generator, and gone back to the old storage battery ignition of unhappy memory? I have met humble purchasers of such cars who were informed by salesmen, at the time of purchase, that the direct current generator was practically a magneto. I cite this, together with Mr. Mercer's question, as evidence of the fact that much of the information upon which the public bases its demand for electric lighting was the kind of information which "isn't so."

Mr. Mercer thinks the tourists in the Indiana Pacific Tour, who burned their electric lights in the daytime to keep from overcharging the batteries, were "scared before they were hurt." If so, the expert electrical service men, who examined the batteries and at whose suggestion the lights were burned, stand under a very grave charge, and the humble user who is not an electrician may, from this very circumstance, draw some inference as to the accuracy of Mr. Mercer's suggestion that the layman should be able to analyze and remedy the troubles of an electrical system.

Batteries Receive Little Care

A moment's thought on Mr. Mercer's part will show him that there is no possible connection between the life to be expected from large, substantial batteries used in stationary work and cared for by experts, and the batteries now being used on gasoline automobiles and abused by people who will not even take the precaution to read a storage battery instruction booklet.

If Mr. Mercer thinks that dash lighting for gas lamps requires an intricate system of wiring, it is quite evident to me that he never took the trouble to look into one. The chief reason why this system has not attained widespread vogue is that "push-the-button" lighting was not in sufficiently general demand until recently to warrant the expending of much thought on its possibilities. In recent years, people who were willing to acknowledge that its convenience was adequate still found greater attraction in the alleged cheapness of electric lighting. I do not wish Mr. Mercer or any other reader to infer that I am claiming that such a system is infallible; I have used it on my own car for over a year, and have at times found that through a loose connection or weakened battery or other cause, the lighter fails to work. But, at such times, if I do not care to look up and remedy the trouble, I fall back on the match and go ahead.

Now as to gas starters—and this only because Mr. Mercer brings up the subject—the gas starter is nowhere near as black as it has been painted. In the hands of anyone who really understands a gasoline motor, it is a remarkably simple and efficient servant. But that statement also shows its weakness—that is, the people who have a working knowledge of the gasoline motor and the principles of the acetylene starter are too few.

The Gas Starter Did Not Have a Chance

The acetylene starter had the great misfortune to appear when the whole self-starter demand was young, when nobody knew much about self-starters, and when nearly everyone expected a gas starter to crank an engine, which it was not designed to do and could not do. Coupled with the fact that motor car manufacturers were looking for a self-starter as a talking point yet not at all careful about their installation, it is easy to see why the gas starter did not have a chance, in most cases, to fulfil even its actual mission. We find that the average garage mechanic today—even after all the educational work which has been done—does not appreciate that care must be used, when installing a gas starter, to see that the acetylene must be fed into the cylinder in such a way as to form a thin firing mixture, and that the connections must be tight. We find that wherever we can install a gas starter, in a city where we have a branch, or wherever used by people who understand motors and gas starters it usually gives satisfaction, but nobody realizes better than ourselves the fact that the gas starter will never be again in general demand, because it isn't a cranking device and because the great numbers who expected it to actually crank the engine were disappointed and gave it a "black eye."

Electric Lighting Cost Continual

S. W. Rushmore's method of figuring electric lighting expense in your September 4 issue is unique. He allows for cost of operation only while the lights are burning. The fact is, of course, that electric lights cost as much per hour during the day time, when the lights are not used, as they do when the lights are burning. In fact, a man who does not use his lights at all pays his bill just the same. The user of gas pays for his light only while he is using the light.

He states that acetylene cannot be used conveniently except for head lamps. Acetylene can be used conveniently, not only for headlights, but for side and tail lights; and all five lights can be lighted or extinguished by the driver from his seat; and not only can be but is burned that way on thousands of cars today in America. Another feature of this particular burning of gas in the side and tail lights is the fact that the side lights on the acetylene-lighted car may be turned out when the head-

lights are lighted; whereas, on the electric-lighted car the sidelights must be kept burning when the headlights are lighted, if the driver wishes to see to the side of the road.

Mr. Rushmore's statement regarding the consumption of 3 cubic feet of gas per hour for the lighting of five lamps is rank nonsense. The average gas headlight has a ½ cubic foot burner, while 1-8 cubic foot burners are provided for side and tail lamps. Even if all five lamps were burned at once, the gas consumption would be 1 3-8 cubic feet per hour. A small percentage of gas users employ 3-4 cubic foot burners in the head lamps, and some people use 1-4 cubic foot burners in the side and tail lamps—the difference in gas consumption is easily figured.

Kebler Ignores Many Important Factors

Leonard Kebler's contribution is brimful of unfair and misleading statements. He takes the mileage per gallon of gasoline on the Indianapolis brick speedway, and assumes that the owner of the car will get this in daily service. He then goes on to show that the gasoline consumption of the dynamo on this basis would be less than the cost of acetylene lighting. The gasoline consumption is only one item of the cost. He ignores battery depreciation, lamp bulb renewals, electrical repairs, and all other phases of electric lighting expense. His unfairness in this is self-evident.

Mr. Kebler says that the average headlight has a 16-candlepower bulb but ignores the fact that the average user replaces the 16-candlepower bulbs with larger bulbs which give considerably more light.

Who Theorizes on Consumption?

He also states that the ampere consumption of two headlights and one tail light gives a discharge rate of about 6 amperes. Take Mr. Rushmore's allowance of 1.5 watts per candlepower, multiply this by the candlepower of the tail light, and the two headlights (whatever they may be), divide this by the number of volts, and see what the result in amperes is.

Mr. Rushmore's allowance of 1.5 watts per candlepower for any tungsten miniature filament is perhaps too generous, as the lamps sold today will consume an outside average of 1.25 watts per candlepower. At that rate the consumption of the 16-candlepower headlight would be 3.33 amperes at 6 volts, whereas 21 candlepower tungsten would consume about 4.37 ampere at 6 volts. A 2-candlepower lamp, such as used in the rear light, about .4 of the ampere at 6 volts.

Check these figures up against Mr. Kebler's estimate of 6 amperes and against my estimate of between 9 and 11 amperes, and then to make certain, step to any electrically lighted automobile, ascertain the candlepower of the headlights, turn on the headlights and tail lights, note the ammeter reading on the dash, and see which one of us is theorizing.

Rushmore Is Fair on Battery Life

Mr. Kebler says that a charging rate of 10 amperes is sufficient. Mr. Rushmore is considerably more fair and accurate when he allows for a 25 per cent. loss in the storage battery, which Mr. Kebler overlooks.

Mr. Kebler criticises my statement that batteries used for lighting alone are having an average life of less than 2 years. On this point permit me to quote Mr. Rushmore: "The battery costs $20 and will last about 2 years." Personally, I wouldn't want to use any $20 batteries, but Mr. Rushmore's statement of the average battery life is a fair one.

Electric Systems Require Heavier Parts

The statement by Mr. Kebler, insinuating that electric equipment has not contributed heavily to the increased weight of automobiles, will prove highly interesting to automobile manufacturers. Mr. Kebler is well aware of the fact that the difference in weight between an electrical system and a gas system, is only a part of the story. I am satisfied that he is well posted enough to know that frames and other parts have been made heavier; that motor sizes and tire sizes have been increased; that weight has been added all through the car—and all of it due to the additional weight and power consumption involved in electric equipment. Take the recent announcements of certain medium-priced cars which have this year been redesigned to carry electric equipment, and make comparisons along this line with the 1913 model. Take the printed announcements of certain automobile manufacturers who, in selling their speed roadster models, are anxious to relieve the car of the weight and power consumption of the electric system and substitute a gas system instead. It seems evident that these automobile manufacturers have acquired experience which does not dovetail with Mr. Kebler's theories.—R. H. Coombs, Prest-O-Lite Co., Inc.

Automobile Trade Opportunities Offered in Foreign Fields

MARKET for Motor Trucks in Naples—It is only within the last few years that automobile wagons and trucks of any description were seen in the streets of Naples, and at present the number is limited to a few heavy trucks used by the military authorities in transporting war material and soldiers from the railway station to the docks for transportation to Tripoli, and two or three owned and operated by private concerns. These are of the heavy type of trucks capable of transporting as much as 6 tons, and are manufactured by the Itala, Fiat, Isotto-Fraschini, and Zust companies of Italy.

There appears to be a better opportunity there for the utility delivery wagon than the heavy truck. A few of the most enterprising department stores of Naples each have one lightweight motor delivery wagon, and the advantage of operating these labor and time saving vehicles will probably be more fully appreciated by other firms in the near future.

The municipal authorities of Naples appear to be considering the adoption of more modern vehicles in the street-cleaning department. They are at present experimenting with motor street sweepers and water carts, such as are in use in the northern cities. The garbage motor trucks are about 60 horsepower, and water wagons 35 and 40 horsepower, and the street sweepers 20 and 25 horsepower. All are of Italian manufacture.

The old-fashioned heavy mail wagons of Naples are still drawn by horses that travel at a very slow pace. Sooner or later this old order of things will doubtless be reversed and modern motor vehicles will supersede them and greatly improve the service, when the mail will probably be collected and delivered more economically and rapidly than is the case at the present time.

The Director-General of Post and Telegraph, Rome, would be the person most interested in the introduction of motor vehicles for the postal service of Naples. All communications to him should be in the Italian language, and this applies to correspondence with all the officials of Italy. The names of some of the important agents of automobiles in the Naples consular district who would probably be interested in American automobile truck and delivery wagons may be obtained from the Bureau of Foreign and Domestic Commerce. In corresponding with these firms French or Italian should be used.

Motor Plows—An American consul in India reports that a government official in that country is at present considering the feasibility of encouraging the introduction of motor plows into that country. He desires to correspond with American manufacturers of plows suitable for that country, with a view to securing information regarding the same. In writing to this official any special American trade or technical terms should be defined, and the specific gravity, flashing point, etc., of the liquid fuel used for motor plows should be definitely stated. Information is also desired concerning American motor plows driven by steam as well as by oil. Correspondence should be in English. File No. 11,145.

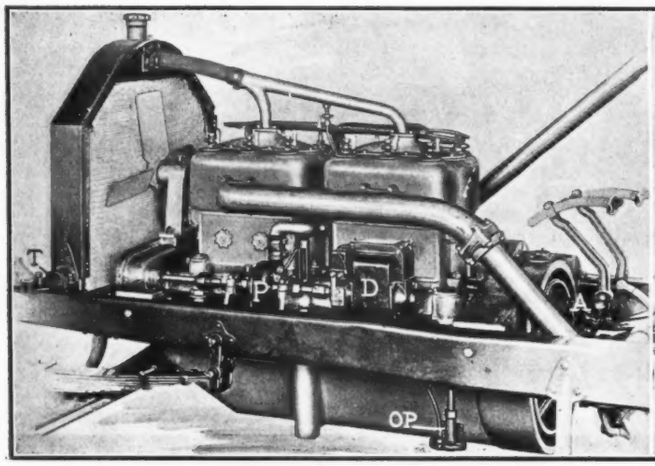


Fig. 1—Exhaust side of Stutz four-cylinder motor for 1914

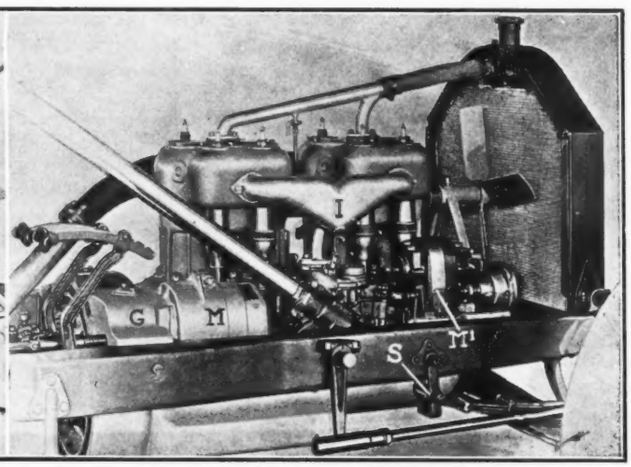


Fig. 2—Intake side of new four-cylinder Stutz motor

Stutz Has Four and Six on One Chassis

New Motors Are Interchangeable and Same Bodies Are Fitted on Either Type—Wheelbase 10 Inches Longer on Six Touring Car

CLOSE upon the victory of the Stutz car in the Elgin National Trophy Race follows the appearance of the Stutz line for 1914. The new cars are to be known collectively as the series E as those for 1913 were called series B. The two chassis in the new line are called E4 and E6. This reference to two chassis is somewhat confusing for, as a matter of fact, one chassis is used for both the four and six-cylinder models, the new six-cylinder motor and the new four-cylinder motor being interchangeable in fitting under the same length hood. Aside from the motors the four and the six-cylinder models are practically the same, the bodies furnished being the same whether the motor is a four or six-cylinder.

Four bodies are fitted to either model—two two-passenger bodies, one a roadster and the other a racy creation known as the Bearcat, both on a 120-inch wheelbase. The third body is a six-passenger touring car on a 130-inch wheelbase, and the fourth a coupé on the roadster chassis.

Aside from the motors there has been little change in the cars except the abandonment of the disk clutch for the cone type. Stutz combined gearset and rear axle construction is retained.

Accomplishment of the feat of putting a six-cylinder motor under the same length of hood as the four has been made possible by casting the cylinders in sets of three instead of in pairs as was done in the 1913 sixes. Not only does this give compactness, and hence a more rigid and stronger construction, but it simplifies the carburetion problem by having only two inlet holes in the motor.

The new six-cylinder motor is a little smaller than the original six which appeared last February. The new motor has a bore of 4 inches while the older one was 4¼ inches in cylinder diameter. The stroke, however is the same—5 inches. The cylinders are of the T-head type as in former Stutz practice, and are offset ¾ inch, which is unusual in a T-head motor. The four-cylinder motor has the same dimensions as the older four, 4¾ by 5½.

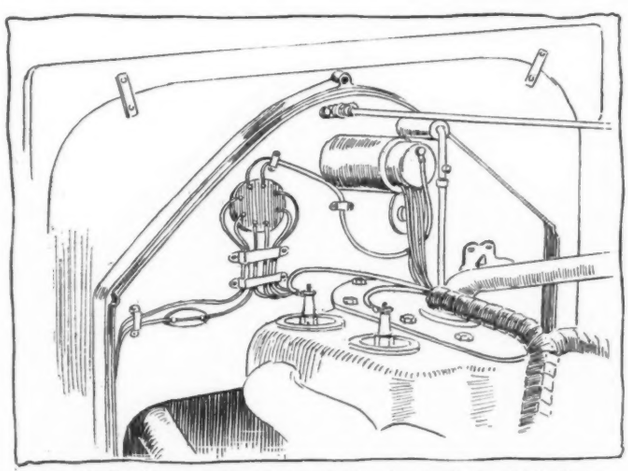


Fig. 3—Dash arrangement under the hood of the 1914 Stutz

In the details of construction the four and the six are very much alike and these can be understood by a consideration of the four in detail first. Its bore of 4¾ inches gives the motor an S. A. E. rating of 36.1 horsepower, but factory block tests show over 60 horsepower at 1,500 revolutions per minute crankshaft speed.

The cylinders are cast in pairs and are of close-grain gray iron. Valve chambers, waterjackets and cylinder heads are cast integral and the top plate is of bronze. The pistons are fitted with four rings and have four oil grooves to assist in the distribution of the oil on the cylinder surfaces.

Wristpins are hollow and are of hardened tool steel ground to fit. A feature that makes for easy maintenance is the use of adjustable connecting-rod bushings fastened with four through bolts. Forty-point carbon steel forms the 2-inch crankshaft which is supported on three white-bronze bearings. The camshafts are of the same steel alloy as the crankshaft and run in large bronze bearings.

The pushrods have roller bearing ends, are of tool steel and each has a case-hardened screw which gives the tappet adjustment. A unique feature of the motor is the method of inclosing the valve operating mechanism. Each push rod with its valve spring is inclosed separately by an aluminum housing split in the center and held in place by means of a spring so that the housing can be removed in an instant.

The valves have nickel-steel heads and are 2½ inches in diameter. The crankcase is aluminum and the upper half supports the crankshaft bearings with webs which extend through the entire depth of the case to insure rigidity.

Lubrication of the motor is by means of pressure feed of oil through a hollow crankshaft. The oil is pumped from a reservoir in the crankcase to ducts leading to each crankshaft bearing, thence through the hollow crankshaft to each connecting-rod bearing. The upper ends of the connecting-rods and the cylinders are oiled by crankcase splash.

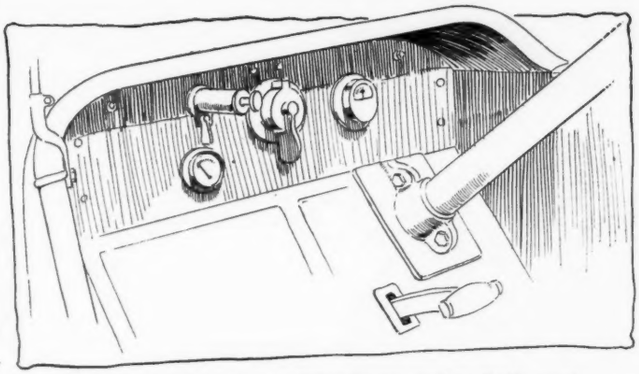


Fig. 4—Arrangement of instruments under Stutz cowl

The electric starting system consists of a separate motor and generator system designed by Harry Stutz and built by the Remy company. The electric generator is mounted upon the left side of the engine and is driven from the pumpshaft. The motor is mounted on the right side of the engine upon the rear supporting arm of the engine which forms the housing for the reduction gear to the flywheel. The system is a 6-volt design and the units are all inclosed and are ball bearing. The cranking motor is of the series type and is capable of turning the engine from 75 to 120 revolutions per minute. The torque of the starting motor is 40 pounds.

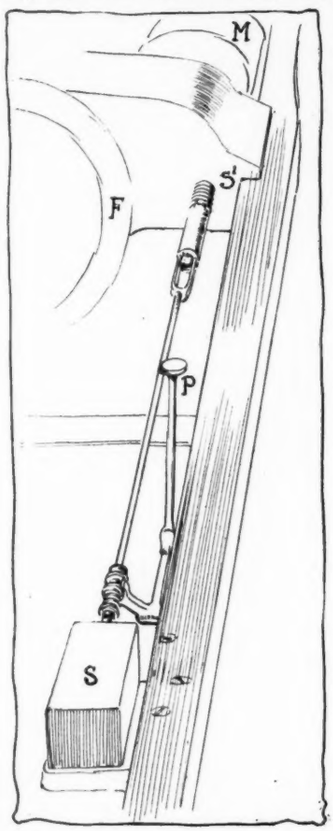


Fig. 5—Diagram of Stutz cranking system

Electric System Is Simple

This system is extremely simple in operation as may be seen from the sketch, Fig. 5. In this illustration S is the switch, P pedal, M the motor, F the flywheel, S′ a spring on the connecting rod to make the starter gears engage easily.

The switch is mounted on a direct line with the motor and at the rear of the engine arm, on the frame side member so that a push on the pedal moves a single rod which throws the switch and shifts the gear simultaneously.

The cooling system includes a centrifugal water pump, a honeycomb radiator, mounted on trunnions and a special fan of very solid construction. A fan adjustment is provided by mounting the bracket so it may be moved sidewise on its base, thus varying the distance between the pulleys. Carburetion features include a Stromberg carbureter with a modified ram's horn type of intake manifold, the latter showing a divergence from last year's practice in that it is of cast aluminum instead of brass, and is water-jacketed, the jacket connecting directly with the jackets of the motor cylinders.

A new feature as applied to the touring cars is the use of a pressure gasoline feed to the carbureter from the tank at the rear. Another one of the new features is the combination breather pipe and oil filler in which the air from the breather is directed downwards. Timing gears have spiral teeth to reduce noise. Instead of the conventional underpan beneath the motor employed in the earlier models, the engine base is carried clear across the frame, and there are ventilators on each side in the hood to give air circulation. The elimination of the underpan provides greater accessibility to the connecting-rods because the lower half of the crankcase can be dropped without removing any other part. The base for the cranking motor for the electric generator and for the magneto are integral parts of the engine casting.

Splitdorf Magneto Is Used

Ignition is by Splitdorf magneto mounted on the left side of the engine and driven from the camshaft which drives the fan. In the roadster and Bearcat models a double system is employed, and on the touring cars ignition is dual.

The six-cylinder motor is of the same general construction as the four-cylinder except that it has a smaller bore and a shorter stroke. The bore and stroke ratio—4 to 5—is not extreme but has been adopted after extensive tests at the factory as giving maximum power combined with elimination of vibration

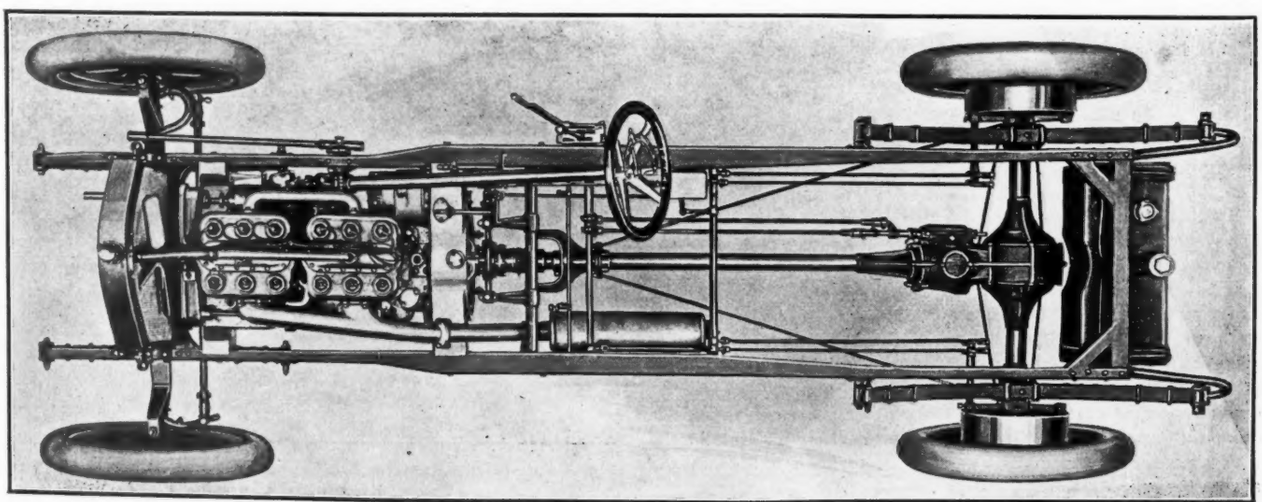


Fig. 6—Plan view of the chassis of the new four-cylinder Stutz, showing sturdy construction

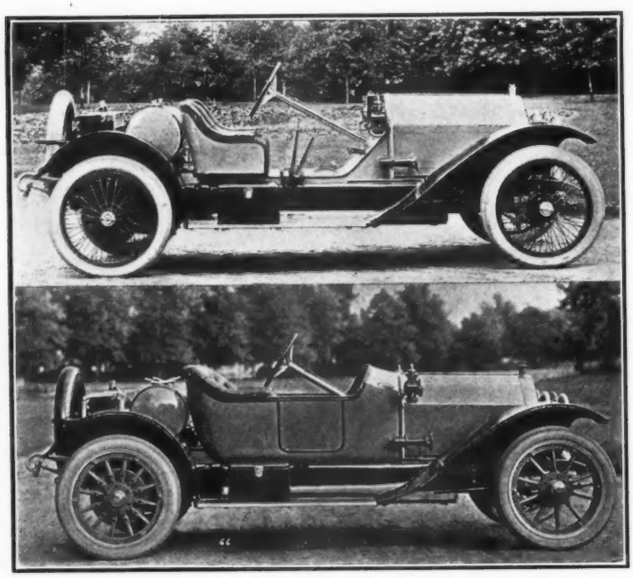


Fig. 7—Upper—Stutz Bearcat model for 1914. Lower—Fore-door body type of runabout of 1914 Stutz line

The crankshaft is supported on four bearings and the valves are inclosed by means of side plates covering each set of three cylinders, instead of by the individual casings used on the four.

As mentioned above the clutch has been changed from the multiple disk of 1913 to a cone type, and a very simple accessible adjustment which is indicated at A, Fig. 1. There have been no changes in the rest of the chassis with the exception of increase in size of brake drums from 14 to 16 inches. The special Stutz rear system, in which the gearset is mounted on the rear axle and provides three speeds, is retained. The axle shafts are supported at the differential ends by tapered roller bearings which not only carry the load but also take up the end thrust. The outer ends of the axle shafts are carried by large annular ball bearings. Instead of keying on the wheels the axle has squared ends for the rear wheels with a round taper fit. Removal of the axle shaft is provided by simply taking off the bearing retainer, so that it is not necessary to take down the differential.

An important item of accessibility is provided in an outside adjustment by which the mesh of the drive pinions and the bevel gear may be altered. By removing two small plates on either side of the differential case an adjusting collar can be reached to move the drive gear in either direction. Annular bearings of liberal size are employed throughout the gearset and the transmission members. The forward end of the propeller shaft runs on roller bearings and the sliding shaft of the gearset has four integral keyways milled from the solid bar.

Gearshift Designed for Positive Locking

In order to eliminate the possibility of the gear being thrown out of mesh, due to the action of the rear springs over rough roads, the gearshift mechanism is located parallel with the torsion tube and is designed to insure a positive locking.

Propulsion is through a torsion tube and radius rods, the former going to a center cross member from which it is swung by a yoke, as are also the brake rod brackets. Front and rear springs are both semi-elliptic, the rear ones being specially long and carried by drop forged steel loops. Shackles are double to insure strength. The spring shackle bolts are bored and counterbored to provide for lubrication and have grease cups which are an integral part of the bolt. Practically all of the outside moving parts are provided with grease cups which are quite accessible so that they will not be neglected. That in the rear spring forward shackle is reached through a hole in the apron.

The Stutz frame is a pressed steel channel 4.5 inches deep and reinforced to a width of 3 inches on the top and bottom, and in the middle of the frame where the greatest strain comes. There is a kick-up of 2.5 inches in the rear which aids in the straight-line drive. To allow a short turning radius the frame is inswept 3 inches in front of the dash.

Right drive and right control are retained, although a new feature of the Stutz control is the use of adjustments on the clutch brake pedals for tall or short drivers.

The dash is covered with metal to the radiator arch and the indicating instruments and control switches are located on a cowl under the dash where they are protected from the weather. On the steering column is provided an air adjustment by which the mixture in the carbureter may be altered.

Body Designs Somewhat Altered

Body designs have been altered somewhat, the touring car bodies being 8 inches longer than the 1913 models. Two inches of this addition is in the forward compartment where there is 6 inches more leg room in the tonneau. The straight line effect is produced by the six-passenger arrangement, two of the passengers being carried in the extra seats. However, the body this year is 2 inches wider all the way back from the dash. Another change in the seating arrangement is the use of a single cushion in the driver's compartment instead of the two cushions with an arm between formerly employed. The object of this is to give more room for two forward occupants and also to make it easier for the driver to slip into his seat.

The sweep of the fenders has been altered so that a more graceful line is produced and the 1914 practice of plain pressed steel fender is followed. The roadster body is equipped with a large gasoline tank on the rear deck and also a trunk for luggage and double tire irons for spares. The gas tank at the rear is supported on cast steel brackets to which are riveted steel straps which pass under the tank. This does away with the chance of loosening the tank or opening seams due to vibration.

The racy type of roadster, the Bearcat, is similar in every respect to the roadster but has slightly higher gear ratio. The coupé is fitted to the roadster chassis and has such features of luxury as tufted cushions of Turkish design 12 inches thick and with black walnut and broadcloth trimming above the belt line. A luggage space is provided inside the body back of the seat. The capacity is for three persons.

An option of wire wheels at a slightly increased cost is offered on all of the models.

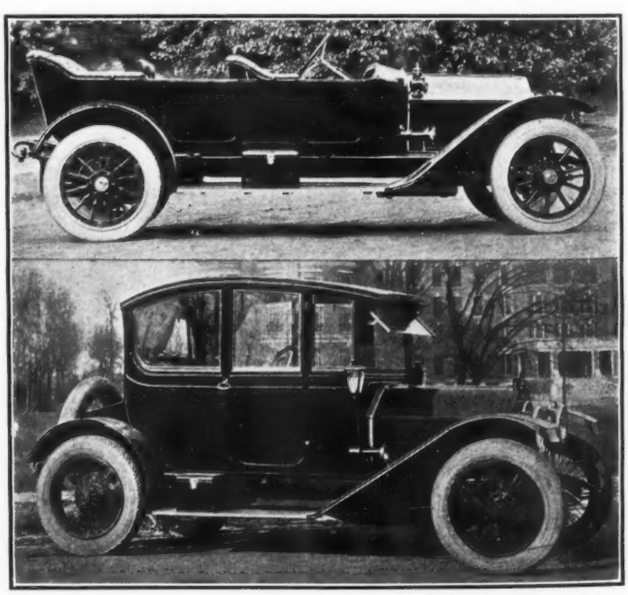
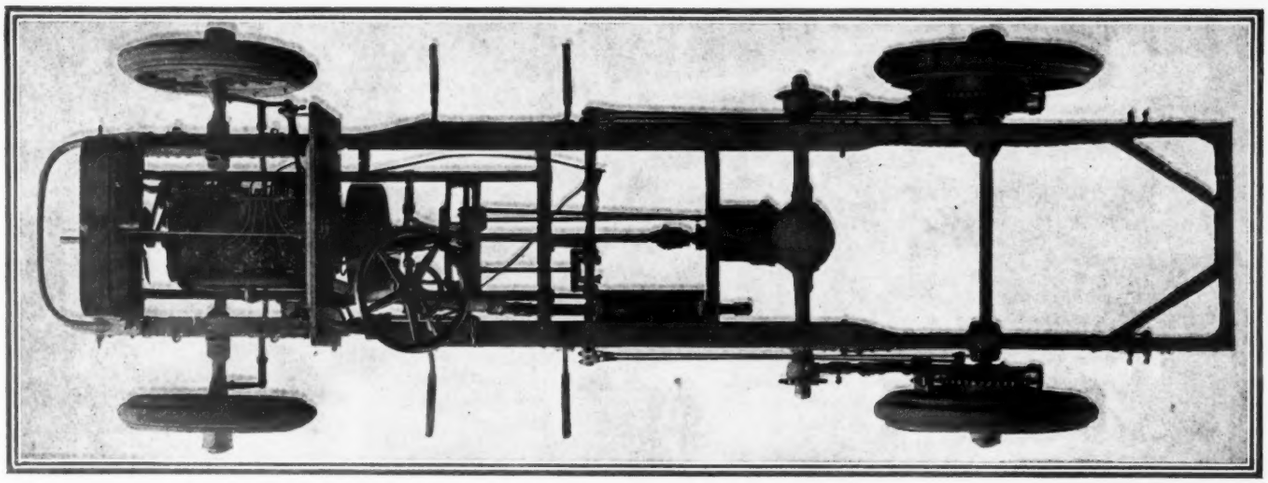
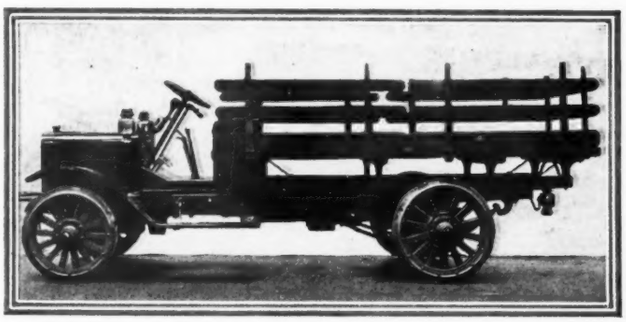


Fig. 8—Upper—Six-cylinder touring car. Lower—Stutz Inside drive Coupé fitted with wire wheels



Plan view of the 2-ton truck manufactured by the Star Motor Truck Co., Ann Arbor, Mich. Note gearset location



Side view of the 1-ton type made by the Star company

Two Models of Star Truck

Four-Cylinder L-Head Motor Used in Both the 1 and 2-Ton Vehicles—Smaller Motor in Lighter Truck

Gearset in Unit with Jackshaft and Differential Casings—Reduction Ratio 8 1-2:1 on Both Models

THE Star motor trucks are built by the Star Motor Truck Co., at Ann Arbor, Mich., and the entire output of the factory is being distributed by the Star Tribune Motor Sales Co., of Detroit. Two models are offered, one of 4,000 pounds and the other of 2,000 pounds rated capacity, designated as models A and B respectively. There are no striking novelties about this line, but the combination of well-known standard units has been effected in such a way as to give an impression of well-balanced design and rugged construction.

The motors in both models bear the Continental name. In the heavier vehicle the 4 cylinder L-head motor is used which has a bore of 4⅛ inches and a stroke of 5¼ inches. The smaller power necessary for the 1 ton truck is developed by a similar motor of 3¾ inch bore and 5¼ inch stroke. Either a Stromberg or a Schebler carbureter of the 1¼-inch size is fitted to both motors.

Incorporated in the flywheel of the model A truck is a cone clutch which delivers the torque to the gearset through a shaft having two universal joints. Aside from the use of a multiple-disk clutch, with thirteen Raybestos-covered steel plates and three springs, on the model B instead of a cone clutch the transmission mechanisms are of the same type in both cases but varying in proportions, of course, to correspond with the difference in the load capacities.

The gearset, of Brown-Lipe manufacture, is combined with the jackshaft and differential casings so as to form one unit. A choice of three speeds forward and reverse is obtained through a center control lever at the driver's right. From the jackshafts the drive is taken by chain. As shown in the chassis view, a large cover is provided for inspecting, cleaning and lubricating the differential gears and it is easy to remove this plate even when the body is in place. The combined reduction ratio of sprockets and bevels is 8½ to 1 on both models.

The frames on these trucks are especially heavy, and well braced, and have the distinctive feature of an increase in the width of the flanges through the portion of maximum bending moment. The front ends are swept in to increase the steering lock and solidly attached to them is a neat appearing and very serviceable guard for protecting the radiator from injury. On the bigger truck the top of the frame is about 28 inches from the ground when no other load except the body is added to the chassis.

Brake Drums Clamped On

Wheels usually do not require much comment, but in this case the method of fastening the rear sprockets and brake drums without weakening the spoke is worthy of note. Instead of drilling the spokes for bolts to pass through, the drums are clamped on with bands, which are similar in shape to spring clips. These pass around alternate spokes. The spokes on the 2-tonner are fourteen in number for both front and rear wheels and have a square cross-section. In front they measure 2 inches and in back 2½ inches on a side. Except on special orders, the driving wheels are fitted with 34 by 5-inch single solid tires and the front wheels carry 34 by 3½-inch tires. The tread is 56 inches.

In order to keep the distance from the ground as small as possible and at the same time to use springs of a large opening, the spring seats are forged on the under side of the rear axles and the springs thus underslung are attached by U-bolts of circular section.

Both sets of brakes act on the rear wheel drums which relieves the chains of the braking strains induced when jackshaft or transmission brakes are used. The driving thrust is carried to the frame by adjustable radius rods which have a bearing on the jackshaft housing.

The standard stack body for carrying the 4,000 pound load has a minimum length of 128 inches back of the driver's seat and is 65 inches wide, giving a floor area of almost 58 square feet, or a rated capacity of 69 pounds for each square feet of area. This compares favorably with standard practice as shown at the 1912 truck exhibits, where a study of vehicles of this class showed that the average load figures varied from 61½ to 72½ pounds per square foot of floor area.

Naturally the body and wheel base dimensions are smaller for the lighter load carried by the model B. The floor extends back of the driver's seat 94 inches, and the wheelbase is 120 inches. The model A wheelbase is 120 inches.

Rauch & Lang Electrics Have Worm Drive

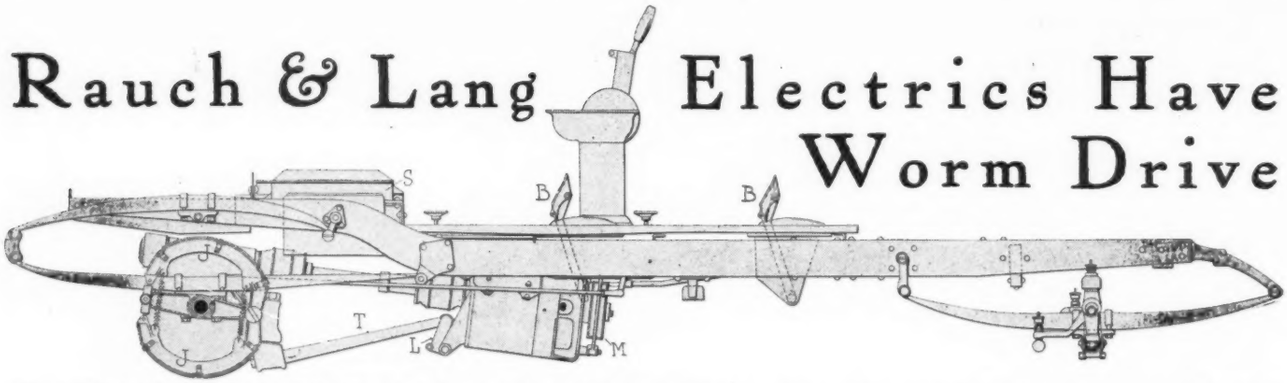


Fig. 1—Schematic side view of the Rauch & Lang chassis, showing mounting of the motor. B and B are the interconnected brake pedals; S is the controller; T is the torsion tube attached to the motor by the toggle joint T; J and J are the brake bands

Great Saving in Weight Is Effected by the Use of a Higher Speed Motor Than Required with Bevel Drive

A GREAT advantage of the direct worm drive as applied to the electric vehicle is that much saving of dead weight can be effected through the use of a higher speed motor and consequently one of lighter construction. The effort to produce a low-speed motor so as to decrease the amount of reduction gearing necessary between it and the road wheels has only resulted in the use of a heavy motor. Weight is not wanted but if a slow motor speed is desired it is an electrical necessity.

In the latest Rauch & Lang electrics, a five-passenger coach, Fig. 2, and a four-passenger brougham, the worm type of final drive with a single reduction from a high-speed motor, has been adopted. In previous models the reduction was double, that from the motor to the propeller shaft being through a silent chain. The maker claims that the change marks a great improvement. The simplicity of the chassis construction and method of supporting the motor for the direct drive is well brought out in the plan, Fig. 3.

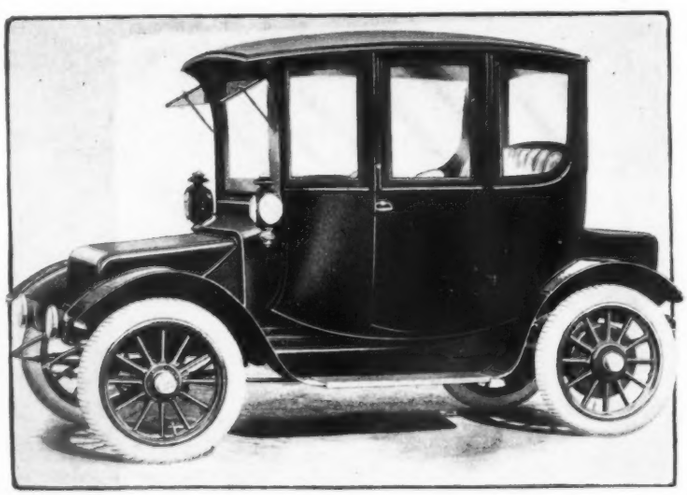


Fig. 2—The new Rauch & Lang double-drive coach

Double Control

Another noteworthy feature of the new design of coach illustrated herewith is the optional provision of a double control by which it is possible to drive from either the front seat or the rear. The control lever is a compact construction fitted conveniently at the side of the front seat, Fig. 4, and also at the side of the rear seat between it and the side. The connections from the front control lever are so arranged that on the seat being swiveled away from the front facing position it is impossible to control the car except from the rear lever. Neither lever can be operated if the other is in use. The brakes, actuated by pedals, BB, Fig. 1, are also interconnected in a similar manner.

The motor is a four-pole machine of Rauch & Lang construction, watertight and weighs 170 pounds. It is suspended amidships in the chassis as shown at M, in Fig. 1 and in Fig. 3. The axis dips slightly forward so that a straight-line drive with the worm on top is obtained. A universal is fitted to each end of the drive as well as a slip joint for complete flexibility.

A torsion rod T, Fig. 1, is located immediately below the driveshaft connecting the rear axle with the motor and taking all torsional strains. The forward end is connected by means of a ball and socket joint with the top of the torsion rod link which in turn swivels on the rear end of the motor casing. The rear end of the torsion rod fits into a steel forging which swivels in a vertical taper bearing on the axle casing. Lubrication of this taper bearing is effected in an ingenious manner by means of a small scoop within the gear casing as shown at K, Fig. 7.

The worm is five-thread with a reduction ratio of 8.6 to 1. It will be seen in Fig. 7 that the worm shaft is carried on large annular ball bearings AA, while the thrust is provided for by a double thrust bearing T, at one end of the shaft. This arrangement for the thrust at one end instead of both makes for ease of adjustment and disassembling. The casing is of cast steel. The worm wheel consists of a phosphor bronze ring clamped between the faces of a steel hub. All joints in the casing are oil tight and the whole is filled with lubricating oil.

Nickel Steel Axle Housing

The rear axle housing consists of nickel steel tubing fitted into the differential casing. End thrust is taken care of by a double-thrust bearing fitted at one end of the differential casing.

Suspension at the rear is by seven-eighth elliptic springs. These are shown in Fig. 1. The forward end of the upper spring is shackled direct to the frame while the center pivots on the bracket support. The lower spring is considerably longer and is also provided with a pivotal connection at the axle housing. Bronze bushings are used for all spring eyes.

The control system affords two starting speeds and four running speeds forward, and four reverse, ten in all. A system of rods and cranks connects the two control levers to the con-

troller proper. This latter is of the horizontal radius type and is located under the rear seats, S, Fig. 1. The various speeds are obtained by cutting out and inserting resistances and also by the use of a bucking coil in the field of the motor. Nickel copper wire is used for the resistances and this is wound on porcelain insulators and contained in a well-ventilated aluminum case suspended in the frame near the controller. The six steps in the forward control are shown diagramatically in Fig. 4, and operate as follows: 1, motor connected to the battery through two steps of resistance; 2, one step of resistance cut out; 3, both resistances cut out, the motor being connected directly across the battery with the fields in series; 4, field coils changed to parallel connection; 5, special resistance shunted across fields; 6, shunt bucking coil on motor field inserted.

Fifth Speed Used Mostly

All ordinary fast running can be done on the fifth speed but if the sixth is used on the level a speed of over 20 miles per hour can be obtained. On a heavy grade the shunt coil acts as a preventative of too heavy a current passing through the motor windings. An electric brake forms part of the control. This braking action is accomplished by running the motor as a generator on a down grade and consuming the power generated in a special resistance which is inserted across the armature winding. This brake is capable of holding the car speed on an 8 or 10 per cent. grade.

A lock that can only be closed when the handle is in the neutral position is fitted to the control arm. Although this prevents any action of the electrical part of the control system the brake is unaffected and can be applied whether the lock is closed or open.

The expanding shoe brakes on the rear wheels, J, in Fig. 1, act on 16-inch diameter by 2.5-inch drums. Another brake, M, is fitted to the front end of the motor. This measures 6.5 by 1.5 inches.

The total weight of the double drive coach is about 3500 pounds. Approximately 75 miles can be run per charge, the battery equipment being forty-two cells. The coach has a wheelbase of 96 inches and is supplied with three types of control; 1, front seat; 2, rear seat; 3, front or rear. Those with only front control can be either wheel or lever steer, the manufacturers making this point optional.

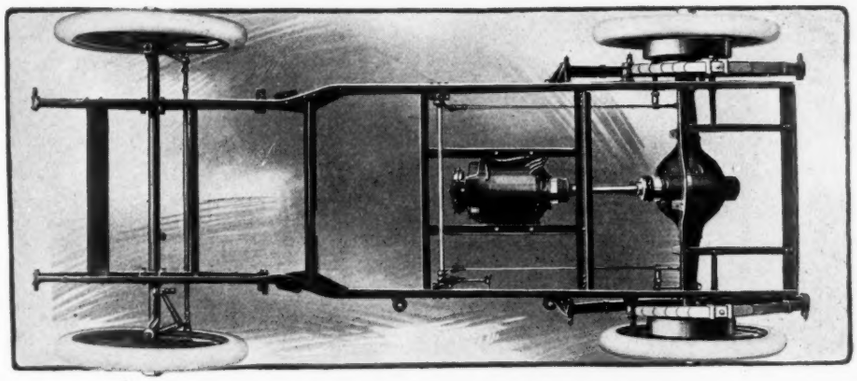


Fig. 3—Plan view of the new Rauch & Lang electric chassis

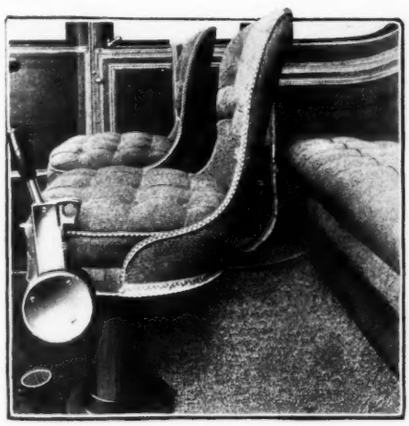


Fig. 4—Mounting of control lever

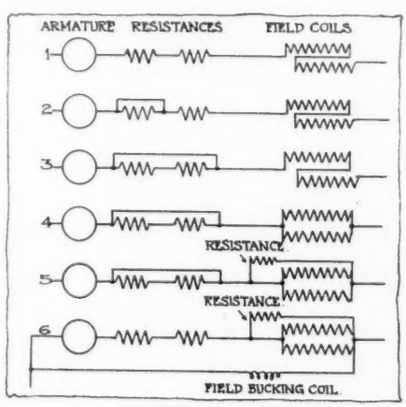


Fig. 5—Six steps in forward control

Rear seat control by lever is standard for the brougham, which seats four and has a wheelbase of 92 inches.

One of the features of the construction of the new Rauch & Lang electric is the use of ball bearings of ample size wherever possible. This is especially true of the mounting of the worm and the worm gear.

Comfortable Upholstery

An idea of the comfortable upholstering of the interior is given in Fig. 4. The front seats are provided with well cushioned backs and are mounted on tubular pedestals on which they turn. All wiring and levers from the control arm on the left chair pass down to the chassis inside the pedestal, leaving a clean exterior finish. The interlocking mechanism in the double control machine is also contained in the upper portion of the seat pillar.

The Rauch & Lang coach type J-4 is offered in five-passenger form with three types of control as follows, front seat, rear seat and one in which either front or rear may be used. With the front seat control a lever the car is listed at $3,100 and with front wheel control $50 additional is asked. With rear control a single lever $3,100 is asked and with the double control $3,200. The brougham with rear lever control is offered at $2,950.

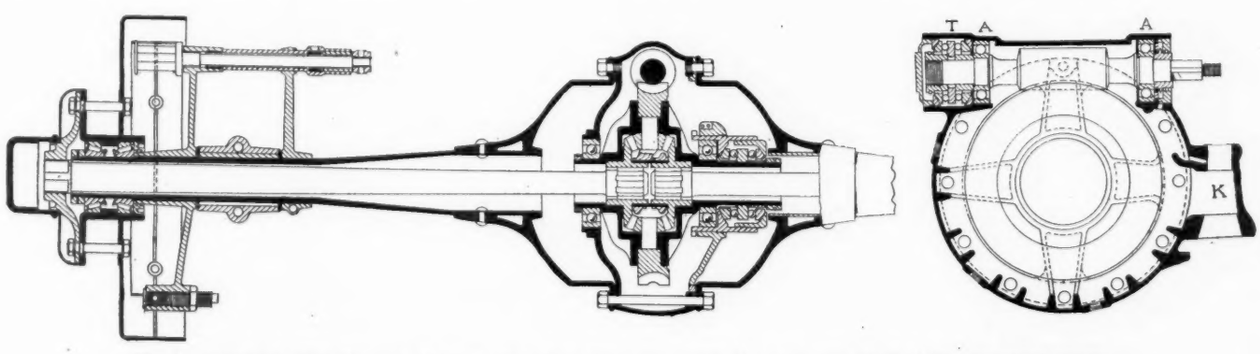
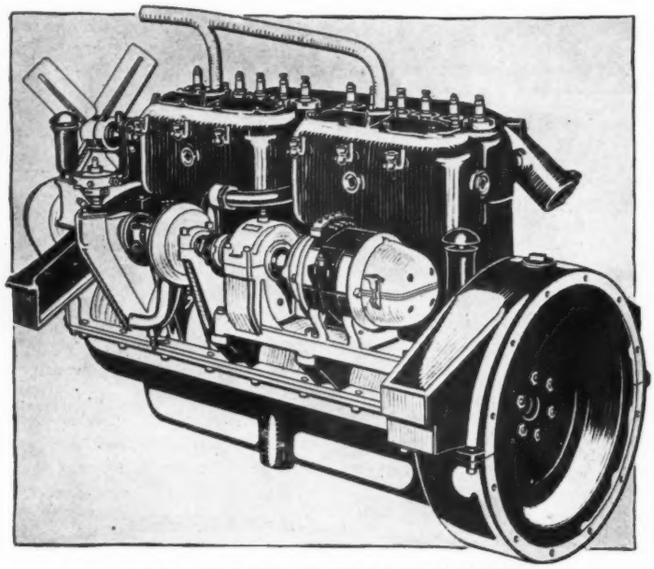


Fig. 6—Sectional view through the new Rauch & Lang rear axle, showing mounting of the overhead worm

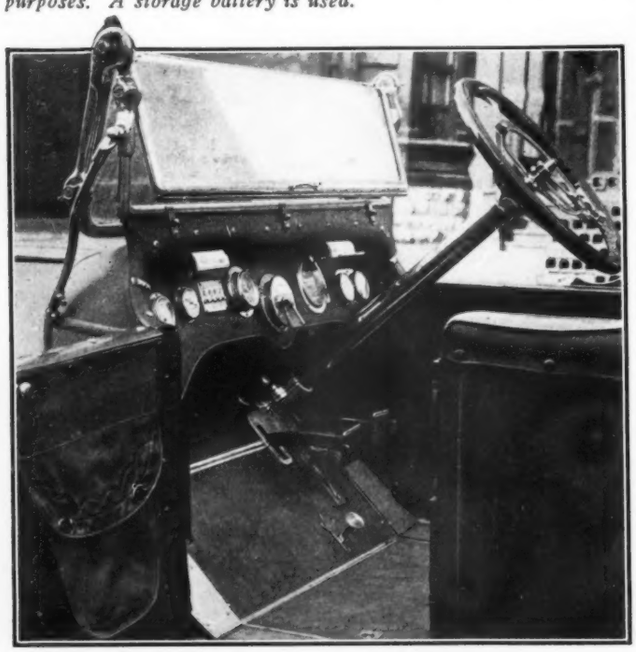
Havers 6-60 Has Larger Motor for 1914

Increase from 55 to 60 Horsepower Effected by Increasing the Bore from 4 to 4⅛ and Stroke from 5 to 5¼ Inches—Body Design Has Been Modified Slightly



STARTER SIDE OF HAVERS 6-60 MOTOR

Showing the North East generator which is driven by an extension of the water pump shaft, also the front and rear motor supporting arms. It is mounted at the rear so as to be in proximity to the flywheel, to which it is geared. The North East system comprises a combined motor and generator which is normally a generator but which becomes a motor for starting purposes. A storage battery is used.



A VIEW OF THE HAVERS SIX DASH

The arranging of the instruments on the cowl board as shown makes for simplicity—note the two lamps which illuminate the cowl.

Features of 1914 Havers Sixes

Equipment on both models complete
Wire wheels as optional equipment
Continental motors on two chassis
North East starting and lighting system
Eisemann magneto ignition is new
Fenders changed slightly for 1914

HAVERS automobiles, product of the Havers Motor Car Co., Port Huron, Mich., are offered for 1914 in two chassis—a 60-horsepower machine and a 44-horsepower model—both being of six-cylinder motor propulsion. They are continued from 1913 with very little change mechanically, although the bodies show refinement in line with the latest in body fashions.

Now in its second year, the large 6-60 model which features the 1914 line was added last season as a running mate to the 6-44. The most important change in this Havers leader, the big six, is the slight increase in horsepower, the maker's rating now being 60 instead of 55 horsepower as given last season. This is effected by increasing the bore from 4 to 4⅛ inches and lengthening the stroke from 5 to 5¼ inches, though no changes in the actual design are found.

Both Motors Are Continentals

Both motors are standard Continental types adapted to Havers use and arranged for the reception of the concern's choice of electrical equipment. The smaller six retains its 3¾ by 5-inch power plant without change. Throughout both chassis, the same design is in evidence, and save for differences in dimensions there is no constructional deviation. The unit power plant idea is carried out compactly, the flywheel being inclosed within a housing which is integral with the rear of the crankcase and the gearbox bolting in turn to this through a flange, as in general practice for this scheme of design.

The cylinders are L-head constructed and valve rods, tappetts and springs are completely inclosed on the left side by aluminum cover plates fitted with hand screws for ready removal. Each pair of cylinders has a common inlet connection to the valve pockets from the fuel-supplying manifold, while to aid in the thorough scavenging of the cylinders after the working stroke, there is an individual opening into the exhaust header from each cylinder. The exhaust manifold passes along the cylinders above the intake, both manifolds being held in position by combination dogs in the usual form.

Balance of Parts Permits Lightening

Absolute balance of all reciprocating parts, in addition to the lightening of these moving parts, has tended to greater efficiency and a material lessening of vibration, however slight it may have been heretofore. However, this lightening process has not weakened the construction at all, but it means that the weight has been taken from those points where it is not necessary. Besides practically eliminating vibration, this lightening of parts is said to effect an increase of power of about 15 per cent. as compared with a motor of the same dimensions not so finely balanced in this way.

Long pistons, provided with oil grooves below the piston pins

and bosses to aid in the even distribution of the lubricant over the friction surfaces and with relief holes through which surplus oil may escape; three eccentric butt-joint rings per piston; drop-forged connecting-rods having adjustable, die-cast bearings with bronze backs at their lower ends, the same being shimmed in place; four main crankshaft bearings fastened to the upper half of the crankcase; four-bearing camshaft with integrally forged cams; helically cut timing gears fully inclosed; and the bolting of the flywheel to a flange which is an integral part of the crankshaft are among the motor features of note from a designer's standpoint.

New Type of Pressure Oil Pump

A constant level splash system of lubricating the motor is employed. The reservoir is at the bottom of the crankcase, and through the medium of oil leads the lubricant is fed to the main bearings and to the timing gears by a new type of pressure plunger pump operated from the camshaft. All piping runs within the crankcase, making for a cleaner outward appearance of the motor, and before it is recirculated to the troughs under the connecting-rods and the gears it is effectively strained. The oil capacity of the reservoir is 8 quarts.

The North East starting and lighting system is retained and is inbuilt into the power plant, being mounted on the intake side and at the rear so as to be in proximity to the flywheel to which it is geared. This electrical unit is a combined motor and generator, normally the latter and becoming automatically a motor when called upon to turn the crankshaft to start the engine. With this electrical system, as with all others, a storage battery is used. This battery, which is the recipient of all excess generated electrical energy, furnishes directly and automatically the current required for lighting the lamps when the engine speed is too low to cause the generator to operate fast enough to perform its generating function or when the engine is not running at all. Instead of a governor or other speed-regulating device for controlling the speed of the generator, an automatic gear arrangement is a feature of the North East apparatus, providing the proper gear ratio between the engine and generator at all speeds

The lighting and starting electrical equipment are independent of the ignition entirely, an Eisemann magneto furnishing the ignition current. This is a difference over last year's models, since the one electrical system heretofore performed the added function of caring for the ignition of the charges as well as lighting the lamps and starting the engine.

On the larger car, the gasoline capacity is 20 gallons with an auxiliary tank at the rear containing 10 gallons. The 6-44, however, has one tank only, this accommodating 18 gallons of fuel. The gasoline is fed by pressure, this being maintained by a pressure pump operated from the camshaft.

Back of the motor is the multiple disk clutch, the plates of which are of steel, alternate ones being lined with a friction material. The clutch is completely inclosed consistently with unit power plant dictates, while back of the clutch and flywheel housing is the gearbox. The gearset is a three-speed combination, the gears having wide faces and being of ample diameter. Annular hall bearings carry the mainshaft and the countershaft.

An inclosed, nickel-steel driveshaft conveys the power back to the floating rear axle from the gearbox, and on the 6-60 model has a diameter of 1⅛ inch. In accord with standard practice where a torsion tube surrounds the driveshaft, a single universal joint is intermediate between the mainshaft from the gearset and the propeller shaft proper. This joint is of the full universal and slip type to take care of any axle deviation. Radius rods complement the torsion tube and brace the rear axle against driving strains. Torsional strains are carried through the frame by a large yoke on the third member of the frame. Conventional service and emergency brakes for standard operation are included, the former contracting externally, while the latter expands from within the drum. Both sets of brakes are lined with Raybestos and are equipped with equalizers. The drums are of large size, having a diameter of 16 inches and a width of 2½ inches.

The spring suspension, which is characteristic of Havers design, is by means of half elliptics in front and platform springs in the rear, giving virtually a three-point suspended rear to the frame, relieving much of the strain to which it would otherwise be subjected due to road inequalities and the like. The front springs of the 6-60 have a length of 40 inches, while the rear side springs are now made 46 inches in length as against 36 inches on the 1913 model. However, the rear cross spring remains as it was at 36 inches length All springs are 2 inches wide.

Getting into the driver's seat of the new Havers 6-60, we find that the steering has been retained on the right, the gearshift lever and the emergency brake lever being at the right also and within the body. All control features are standard.

A very attractive cowl board has been designed, the various gauges, indicators and switches being symmetrically arranged and sunk flush with the cowl. The convenience of the most used of these instruments to the driver has not been overlooked. Indirect lighting of the dash has been carried out notably. There are two small lamps, which are shrouded so as to throw their rays where needed. Looking at the dash instruments, they are, from left to right, pressure gauge on the gasoline tank, gasoline supply gauge, light switches, clock, ignition switch, speedometer, voltmeter and ammeter. All of these are included in the standard equipment of the car.

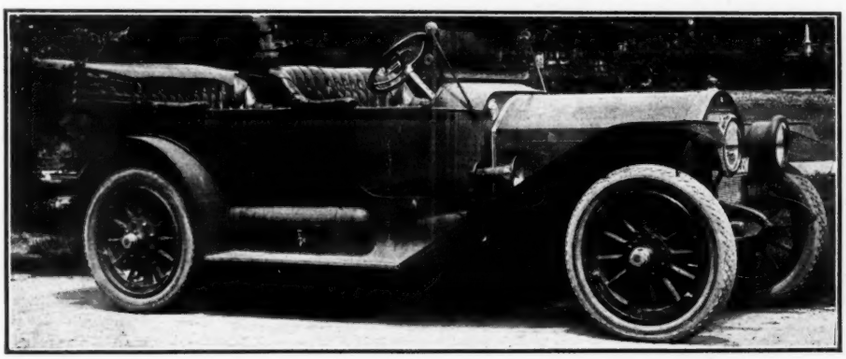
Complete Equipment a Feature

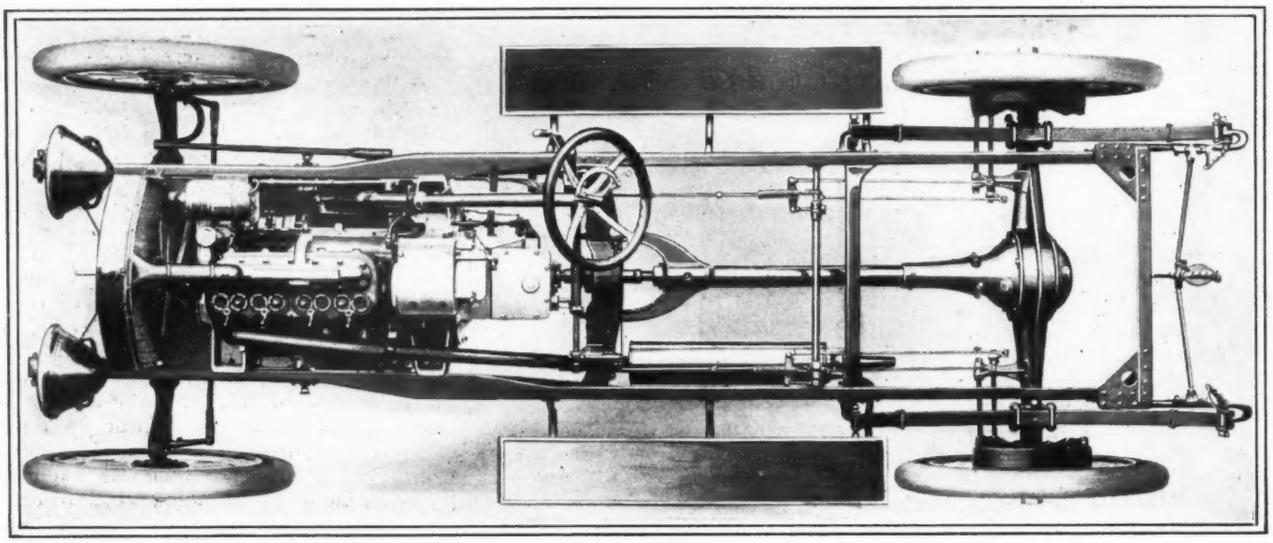
In fact, in the new Havers 6-60, the maker is featuring the complete equipment. Besides the apparatus already enumerated, there are the full nickeled windshield of new design, tonneau light, trouble light with cord, robe rail bag with four compartments (toilet articles in one), top, set of seat covers, dust boot for the top, license holders front and rear, running board foot scrapers, double rear tire irons, power driven tire pump, Klaxon horn, front rubber-cushioned bumper, and usual tool equipment.

The bodies have been brought up to the minute. The fenders have a different curve than last year. They follow the wheels completely at the rear, and at the front they also have a greater tendency in that direction. Running boards are clear; door handles and hinges are concealed. Wire wheels are optional equipment at a slight advance in cost.

HAVERS SIX-CYLINDER TOURING CAR

For the ensuing year the increase in horsepower gained by the adoption of a larger motor will be desired by many, as will the full list of equipment. This includes, besides the regular appurtenances, a newly-designed nickel windshield, tonneau light, trouble light, robe rail bag with four compartments, set of seat covers, etc. The clean running boards and concealed door handles and hinges add much to the smooth appearance of the car. Wire wheels are offered as optional equipment at a slight advance in price.





Plan view of Pathfinder chassis showing mounting of generator, drive and torque members

Pathfinder Refined

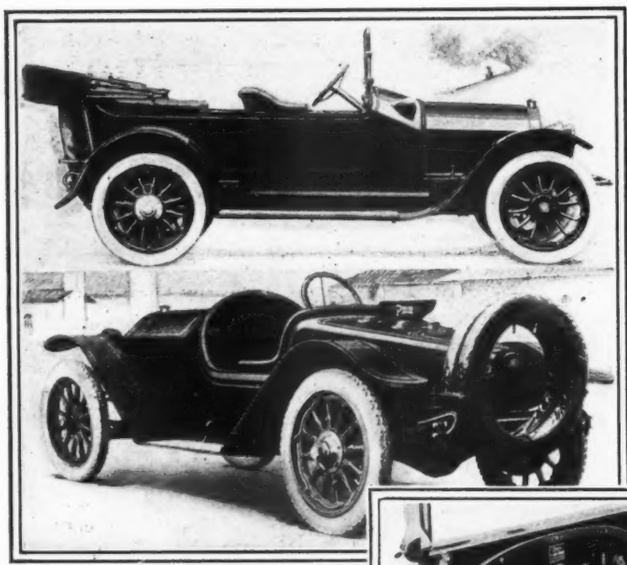
Stream Line Bodies, Greater Accessibility Equipment Feature the Line for 1914

FOR 1914 the Pathfinder is practically the same as it was for 1913. The motor is the same as used last year excepting for the lightening of the pistons and connecting-rods. Many refinements of a minor description have been made about the body and accessories in order to bring this part of the design up to date. Among the latter features may be mentioned the following: The instrument board has been brought nearer the driver in order to have the dash equipment more plainly visible, a bumper has been added to the standard equipment and a battery box taken off the running board and hung on the frame. The windshield is now in one piece and is of a ventilating design which directs a current of air to the driver's feet. The top is now made of leather instead of mohair and the straps between the bows have been concealed. A unique feature which is new is a combination dash light and trouble lamp. In case of stopping on the road through a blowout or puncture the dash light may be pulled out of its socket and the cable plug for the trouble lamp inserted. The cable is long enough to enable the driver to clearly see his tire work.

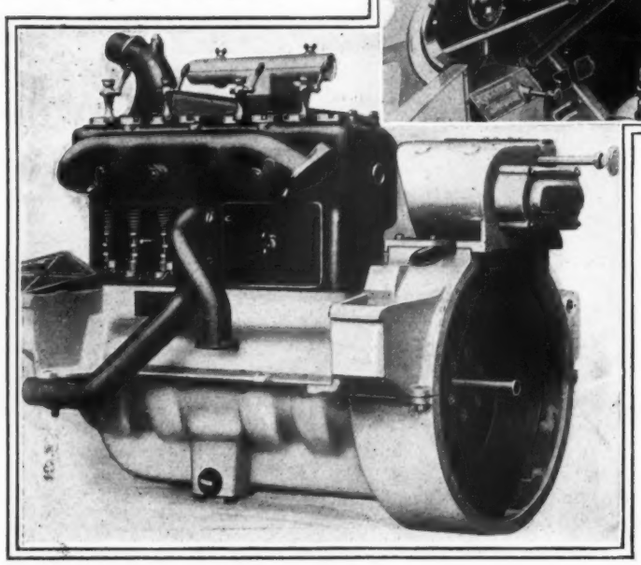
The chassis upon which four types of body are mounted (namely five-passenger touring, two-passenger roadster, two-passenger cruiser and Martha Washington coach) is practically the same mechanically. In brief, the motor is an L-head block casting. The bore is 4.13 inches and the stroke 5.25 inches. The most interesting feature of the motor is the double lubricating system which is designed to maintain uniform oiling on all grades. This is accomplished by having two plunger pumps in the lower half of the aluminum crankcase. One of them sends a stream of oil directly over the gears from which the oil passes over the main front bearings and drains back into the front oil well. The rear pump feeds the oil back over the main rear bearing from which it drains into the rear oil well. The oil troughs communicate with one another. The pumps are driven off eccentrics on the camshafts.

The motor is a unit power plant, the clutch and gearset being contained in the same housing as the flywheel. The clutch is of the cone type and is faced with leather. Beneath the leather there are small spiral spring inserts.

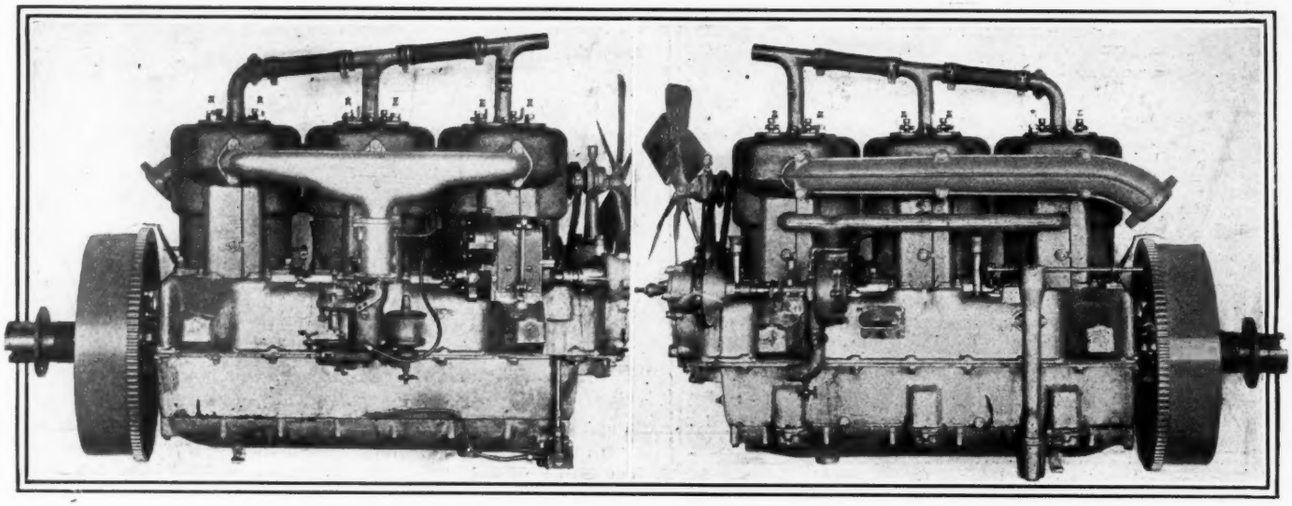
Bodies for the season of 1914 will have a stream line effect given by the more sweeping curves in the fender which has been made perfectly smooth. A new feature of the Cruiser is the optional location of the tail light. This may be carried directly at the end of the pointed rear. The feature of the armored roadster is a luggage carrying compartment behind the seat. Double springs are used in the upholstery. Lighting and starting are provided by the Gray & Davis system.



Touring car and cruiser



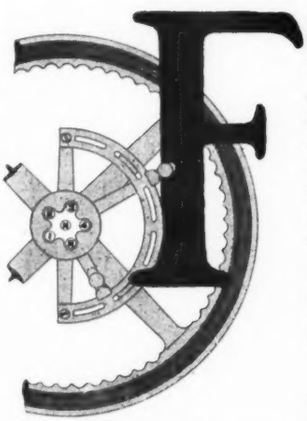
Instrument board—Left side of motor



Intake and exhaust side of T-head motor used in the 6-66 Pullman car which will be continued

Pullman Out With Light Six-Cylinder

Continues Three Standing Models with Many Minor Refinements, Making Two Fours and Two Sixes for 1914



Electric gearshift control

FOR 1914 the Pullman cars will be made in four chassis models. Two of these incorporate four-cylinder mtors and two have six-cylinder motors. One of the sixes will be ready for the market October 1. It is a complete new light six and will be noted by the fact that it will be equipped with the electric gearshift. This new six is the only additional car which has been added to the line but the others have all been extensively improved.

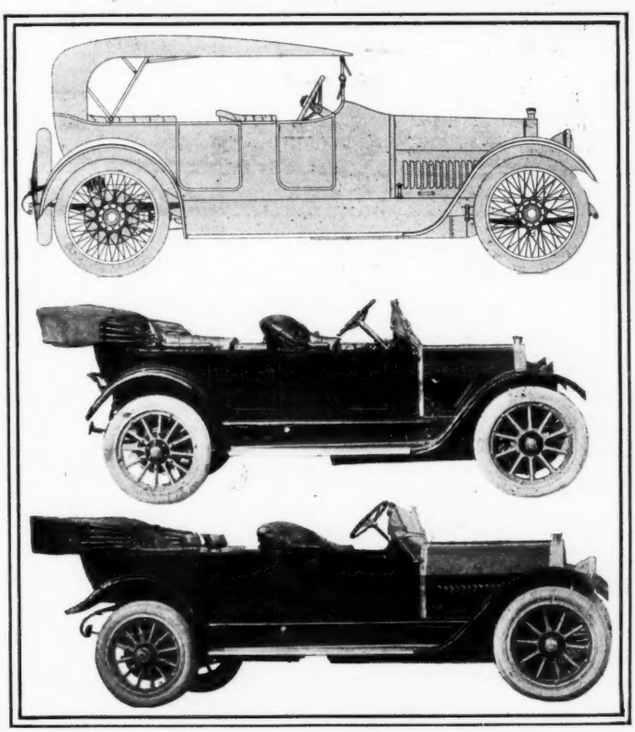
Improvements in the actual construction work on the three standing models which are known respectively as the 4-36, 4-44 and 6-66 include a new piston which is fitted with an oil groove pierced by small holes to prevent an excess of oil from being sucked up into the cylinders. Another improved feature in the oiling system is a micrometric oil level adjustment on motor. This used to be on the dash, but it is now on the motor.

Refinements which are embodied in the entire 1914 line embrace the following: Pressed steel torque connection on rear axle, Westinghouse starter, dog clutch for direct drive in gearset, removable gasoline tank, safety link on rear shackle to prevent springs turning over, reserve feature in gasoline tank, ventilated hood, lower cowl, boots on tie rods and torque barrels. The body work has been beautified by making a rounded instead of a straight back and the windshield is now integral with the instrument board on the cowl. Wire wheels are furnished at $50 extra on the 4-36, $60 on the 4-44 and $75 on 6-66.

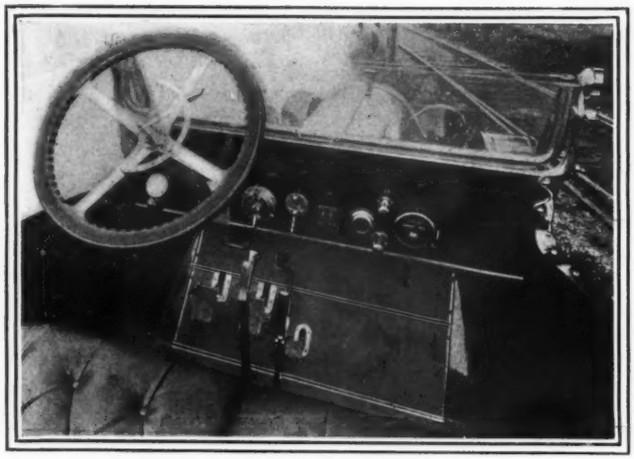
Besides these refinements there are incorporated in the 6-66, the six-cylinder car now on the market, a gear-driven tire pump, 37 by 5 inch tires, special tool equipment, tonneau lamp, and a cocoa mat as regular equipment.

The new six which is brought out under the model number of 6-48, is built generally along the light six lines which have come into vogue in the past year. It embodies advanced design straight through from the small six engine to the electric gearshift and streamline type of body.

The motor used in this car weighs 600 pounds, including the



Upper, new light six; center, 4-44 touring; lower, 6-66 seven-passenger



Control features and instrument board 6-66

flywheel and regular equipment. It is of the six-cylinder L-head type and forms a unit power plant with inclosed valve mechanism and three-point suspension. The bore is 3.75 inches and the stroke is 5.25 inches, giving a horsepower rating of 34 according to the S. A. E. formula. On block tests the motor has developed 38 horsepower at approximately 1,500 revolutions per minute.

The six-cylinders are cast in threes from close grained gray iron which has been aged after the rough boring process to eliminate casting distortions. The cylinder base flange is broad and forms the bases of the guides for the valve lifters. This construction allows for the cover plates which inclose the valves. There are two of these plates each extending over a block of three cylinders.

The cylinder water jackets are cast integrally with the cylinders but have their covers cast separately. The interior of the water jackets are given a sand blast finish and then scraped. Before and after the final machining on the cylinders the jackets are given a water test to detect leakage through cracks or blow holes. The waterjacket cover can be removed by taking out the retaining screws on top of the cylinder. There are eight of these for each block of three cylinders.

The crankcase is made of two pieces and the material is aluminum alloy. All the bearings for the crankshaft are carried in the upper half of the crankcase and the lower half contains the oil reservoir and can be removed when it is necessary to adjust crankshaft and connecting-rod bearings.

The valves are mounted on the right side of the motor and are operated by a single camshaft having the cams integral. The inlet and exhaust valves are interchangeable and have nickel steel heads mounted on carbon steel stems. The valves are 1.875 inches in diameter and are carried on .375 inch stems. The diameter of the camshaft is 1.0625 inches in diameter and the camshaft bearings are as follows:

Front — 2.25 x 2.625 inches;
Middle — 2 x 1.875 inches;
Rear — 1.125 x 2.125 inches.

The pistons are of gray iron and are of the three-ring type. The rings are of the diagonally-split eccentric type ground on both faces. The motors are run under belt power to insure the rings coming to a good fit. The outside of the piston has an oil groove for picking up excess oil. The piston is 5 inches in length and the rings are .1875 inch in width. Piston pin bearing is 1.219 by 1.875 inches. The piston pins are of chrome nickel steel hardened and ground. They are secured in the piston bosses and the bearing surface in the upper end of the connecting-rods is of phospher bronze.

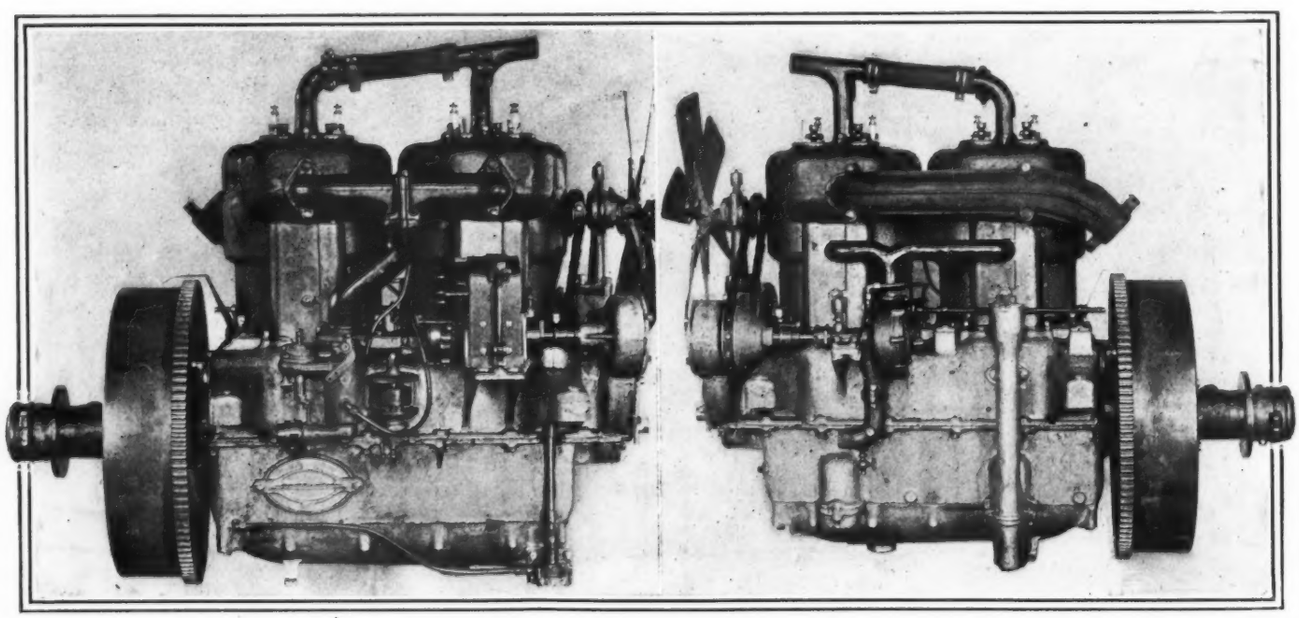
Connecting-rods are of I-beam section made of 40 per cent. carbon steel, dropped forged and heat-treated. They are 10.5 inch in length and the bearings at their lower extremity are 1.875 x 2.375 inches. The connecting-rod bearing caps at the lower end are held in place with nickel steel bolts blocked in place.

The crankshaft is carried on three bearings which measure as follows:

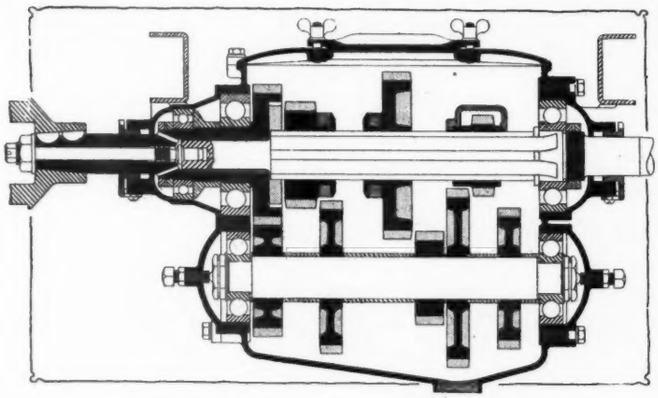
Front — 2 x 3.25 inches;
Middle — 2.25 x 3 inches;
Rear — 2 x 3.875 inches.

The material used in the crankshaft is 40 per cent. carbon steel and after it is dropped forged and heat treated it has a tensile strength of 90,000 pounds per square inch. The three main bearings and the six crankpins are all accurately ground to size, the limit of tolerance being .00025 inch. The crankpins are 1.875 inches in diameter and the main bearings are as given above. Flanges are formed on the crankshaft to take up any end thrust from the clutch.

The timing gears are cut on automatic hobbing machines of the latest type. They have helical pitch and are three in number, the set composing one crank, one cam and one magneto gear.



Left and right sides of motor used in the Pullman 4-44 as continued with minor refinements



Improved gearset used in 4-44 with four speeeds

They are housed in an oil proof gear case on the front of the motor.

The bearings for the crankshaft, camshaft and connecting-rods are lined with nickel babbitt. The connecting-rod and camshaft bearings are secured by brass retaining screws which are locked in place. The bearings are scrapped by hand to fit. The connecting-rod bearing adjustment is made by a series of punched sheet steel varying in thickness. The shims extend into the space between the upper and lower bearings.

Th flywheel is 15 inches in diameter and is held to the crankshaft by six large steel bolts. It is made of cast iron and after being turned is balanced on a running balance machine.

The oiling system is a combination force feed and splash with a constant level. The oil is circulated by pumping it through a gear pump with a gallon a minute capacity directly to the main bearings. The overflow from these bearings goes into the splash troughs and also into oil pockets which are designed to feed the lubricant to the timing gears and the silent chain which provides the generator drive.

A multiple disc clutch is used on this car. It is composed of twenty-one disks alternate faces being covered with Raybestos. The tension is provided by two independent clutch springs. This clutch is housed directly with the flywheel and the housing is carried back to include the gearbox, thus providing the unit power plant.

The three-point suspension feature is provided by a cross-member which furnishes the single point at the forward end and which is provided with a pivot bearing containing a bronze bushing and oiler. The other two points are at the rear of the motor and are formed by supporting arms cast directly on the rear extremity of the crankcase. The cross supporting member at the forward end is of channel section and the oiler consists of an oil cup mounted above the pivot support.

The electrical equipment of the car divides itself into four separate and independent systems for lighting, starting, ignition and gearshifting.

Lighting is taken care of by a Westinghouse six-volt generator connected with a storage battery.

The generator starts charging the battery at car speeds of approximately 10 miles an hour and above. The generator is of the low-speed type turning at 1.5 crankshaft speed. The generator output is controlled inherently by using a compound differential winding. A reverse current cut-out prevents the battery from discharging through the generator when the car is at rest. The headlights can be dimmed for city driving.

The electric cranking motor is an independent unit taking its current from the battery. It operates at 6-volts and is geared directly to the flywheel. The gears on the flywheel are cut directly in the iron wheel and are not only utilized for cranking but also serve as a driving medium for the tire pump which can be swung into action by a lever on the dash as shown in the illustration. It can inflate to 90 pounds in 3 minutes.

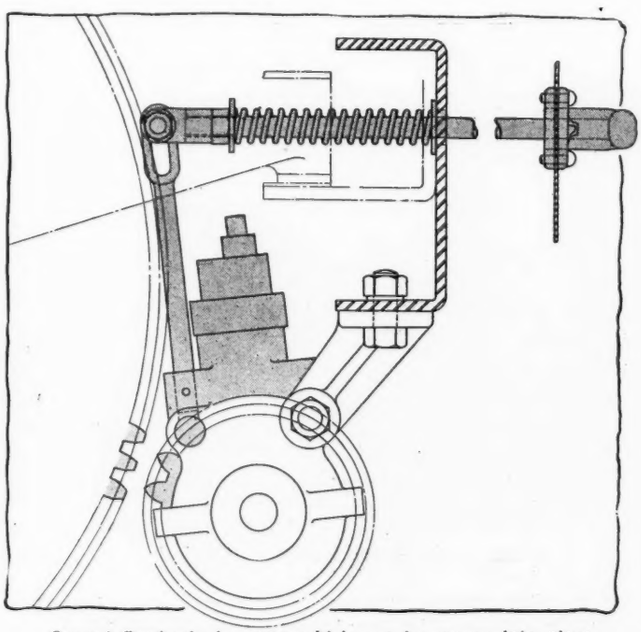
Gearshifting is accomplished by the Vulcan electric device which operates with current taken from the battery. The gearshifting is controlled by a series of buttons located on the end of the steering column which are so arranged that they do not turn with the wheel but are always in the same position. There are five of these buttons in a circle and one button in the center of the circle. The button in the center throws the gears into neutral while the others are for the first, second, third, fourth and reverse speeds. The shifting is done by pressing the desired button down and then depressing the clutch pedal and allowing it to return to its ordinary position. The battery current acts on a series of powerful solenoid coils in performing the work of gearshifting.

The control features are all on the left side of the car and the emergency brake lever is mounted to the right of the driver's seat or in the center of the car. The dash equipment is carried on a cowl board and the gasoline tank of 20 gallons capacity is mounted in the cowl. The carbureter adjustment is mounted within easy reach of the driver who has full control over all adjustments without having to leave his seat. The speedometer has its dial flushed with the cowl board. The service brake is fitted with an independent equalizer.

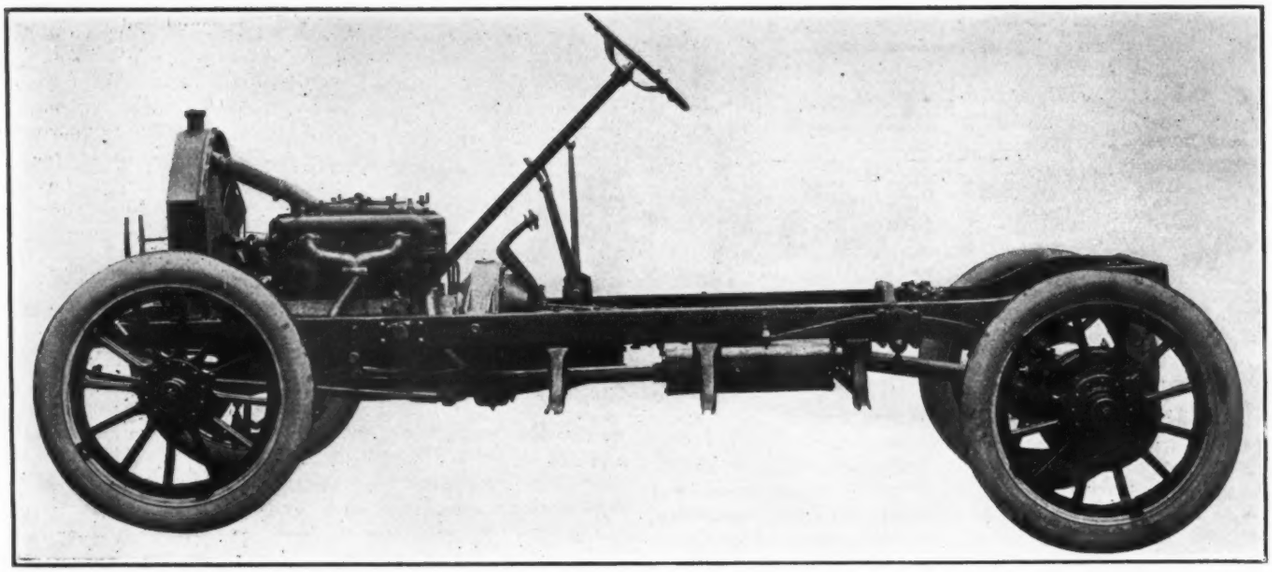
The running gear of this car has been designed to be as easy as possible. The springs are of extra long length measuring 60 inches with nine leaves in back and 40 inches with nine leaves in front. Mott wire wheels are used all around and the deep upholstery helps take the road shocks away from the passengers. A spare wire wheel is carried on a false hub at the rear of the car and is furnished as part of the regular equipment.

In the accessory line this car is perfectly equipped. The top has but a single bow giving great speed in putting up or taking down and the side curtains are carried rolled up inside the top so that it is unnecessary to get out of the car in order to put them up. The tool kit is complete and is carried in the tool box under the front seat. Turkish upholstery is used, the windshield is rain vision ventilating. An electric horn goes with the car and 36 by 4 inch tires are used all around. The wheelbase is 130 inches.

Throughout this new car the ever improving work at the Pullman factory may be noted. The grinding work is all done to .00025 inch, machine work is limited to .001 inch and all through the car the limits are small and the factor of safety as high as permissible in automobile practice. The frame is designed to carry 1,000 pounds more than the probable weight with full passenger load. The brakes are a larger size, being 17 by 2.5 inches.



Geared flywheel air pump which can be swung into place



King chassis for 1914, showing the patent cantilever rear spring suspension characteristic of this car for some time

King for 1914 Has Increased Horsepower

New Motor Develops 30 to 35 Horsepower—Bore Increased .125 Inch—Price Reduced $400

Thermo-Syphon Cooling System Is Employed —Ward Leonard Electric Starting and Lighting Furnished as Extra Equipment

WHILE retaining the novel cantilever rear spring suspension which has always distinguished the cars of its make, the King Motor Car Co., Detroit, places its 1914 cars on the automobile market with increased horsepower, at a much lower price than their predecessors, and at the same time has bestowed additional equipment upon them.

But one chassis is manufactured, on which either a touring car or a roadster body is fitted. Both will sell for $1,095, the sweeping reduction of over $400 being rather startling. For an additional $100, these cars are equipped with a Ward-Leonard electric lighting and cranking system.

The motor used is a standard four-cylinder, L-head type of block construction. The bore has been increased from 3¾ inches to 3⅞ inches, while the stroke remains at 5 inches. The new motor develops from 30 to 35 horsepower, according to the King company. The motor, clutch and transmission are in one unit, suspended in the frame at three points.

All Valves Are on the Left

The cylinders are bolted to an aluminum alloy crankcase, the lower half of which serves as an oil reservoir for the combination force feed and splash system of lubrication. The valves, which have a diameter of 1 13-16 inch are located on the left side and inclosed by two cover plates. The roller push rods and valve springs are interchangeable, while the crankshaft has three main bearings. This crankshaft is 1 11-16 inch in diameter, while the lengths of the main bearings are 3⅛ inches, 3 inches and 4 inches for the front, center and rear respectively. The connecting rod lower bearings have a length of 2⅝ inches.

The Briggs dual system of ignition with one set of spark plugs is used, the magneto being placed upon the right side of the motor and driven by means of inclosed gears. On the left side of the power plant there is an oil pump driven by bevel gears from the camshaft. This pump draws oil from the reservoir and forces it through a tube in the crankcase to pockets over the crankshaft bearings.

Thermo-Syphon Cooling System

A thermo-syphon radiator supported on the frame by brackets and a belt-driven fan comprise the cooling system. The fan is 16 inches in diameter and has six pressed steel blades. It is operated by a belt from the magneto gear shaft. The Stromberg carburetor which is used on the new King automatically gives the proper mixture at all speeds of the motor, and is fed by gravity from a 15-gallon tank under the front seat.

The Ward Leonard electric cranking and lighting system which is offered optionally at $100 extra consists of a separate motor and a separate generator. The electric motor is attached by brackets to the gearset case, and engages with the flywheel of the engine through reduction gears controlled by a hand lever set against the foot-board of the front seat. To start the engine the driver has only to pull this hand lever, when the gears are thrown into mesh with the flywheel at the same time as the electric power is thrown on. As soon as the engine starts, the hand lever is released and the gears automatically disengage. This electric motor is capable of spinning the crankshaft at the rate of 90 revolutions per minute.

Generator Driven by Silent Chain

The generator is suspended underneath the magneto by a bracket and is driven by a silent chain from the magneto shaft. It supplies the storage battery which is a part of the system with current at the rate of 10 amperes at a car speed of 15 miles per hour. The usual switches are incorporated in the system for preventing the overcharging of the battery and for sending the generated current direct to the lights above a given engine speed. Automatic provision is also made for the supplying of the lights with current from the storage battery when the engine is not running at night.

The multiple-disk clutch is inclosed within an integral extension of the crankcase, and consists of six steel driving disks faced with Raybestos, which in turn are in contact with six driven disks of tempered steel so arranged that the clutch is self contained in a unit and no thrust is offered in any direction or on any parts exclusive of the spring pressure on the plates.

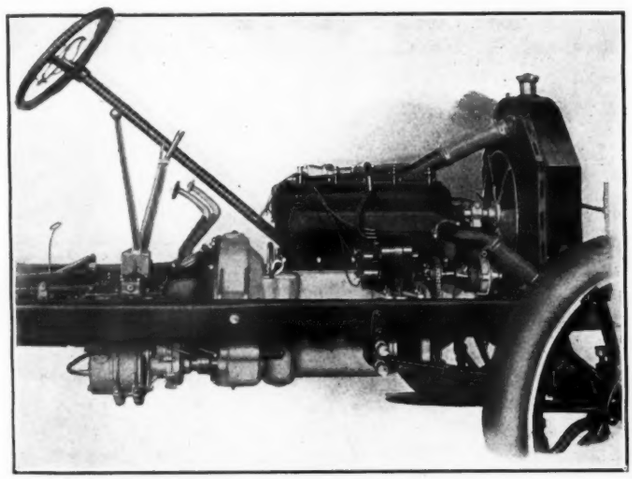
When the clutch is released the spring pressure is taken on the gearset case by a large ball bearing and is not applied to the crankshaft or flywheel.

The gearset affords three speeds forward and reverse. Very wide faced gears are used, and run on a shaft carried on Hyatt roller bearings. Center control is obtained by mounting the control levers directly over the gearcase. The drive from the gears to the rear axle is through a Spicer universal joint and a propeller shaft inclosed in a torsion tube.

The brakes are internal and external and consist of a service brake operating on 14-inch drums bolted to the rear wheels, and an emergency brake of the expanding type operating on a 2¼-inch surface within these drums. The steering gear is a Gemmer semi-irreversible worm and gear type, adjustable for wear.

Special Cantilever Spring

The front springs are of standard semi-elliptic type, and the cantilever type of springs are used in the rear. The rear springs are a modification of the Lanchester springs as used in the English car of that name. These are attached to the frame by brackets through which the springs are allowed to play in a direction horizontal to the frame. The centers of the springs are pivotly attached to the frame by means of trunnion blocks and bolts attached to brackets mounted on the frame. The rear end of each spring is attached by plates and bolts to the rear axle tube on which it is free to turn.



SOME DETAILS OF THE KING CHASSIS

Note the left drive and center control; also the neat arrangement of the wires from the Briggs magneto.

This method of spring construction gives free play to the springs independently of each other, and allows them to act relatively in the same direction taken by resisting forces due to road shock, and to absorb these forces in the line of the greatest resiliency of the spring, it is claimed. A shock-absorber effect is thus produced and to a great extent "side-sway" in passing over rough roads is eliminated, according to the King engineers. Reverse leaves on the under-side of the spring at the center and at the rear end restrain the rebound, and thus eliminate the possibility of fracture and crystallization.

A channel frame of pressed steel, with 4-inch section and 3-inch flange, is employed in the construction of the chassis, and, as no sub-frame is used, the chassis presents a clean, simple appearance.

Floating Adjustable Rear Axle

The rear axle is of the floating adjustable type with the driving member inserted as a unit, thus allowing it to be independently adjusted. The gears are fully inclosed in the torsion tube and differential casing. A removable plate on top gives ready access to the parts. The driving gears are of heavy pitch, and Hyatt roller bearings are used to carry the differential and the shaft.

The two types of bodies which will be used on the one chassis are a two-passenger body with a sloping rear deck and roomy carrying space underneath this deck and a five-passenger body with a rounded back and torpedo-type shroud. The equipment, in addition to windshield, top, electric lights, demountable rims and tools, includes an electric horn and Stewart-Warner speedometer.

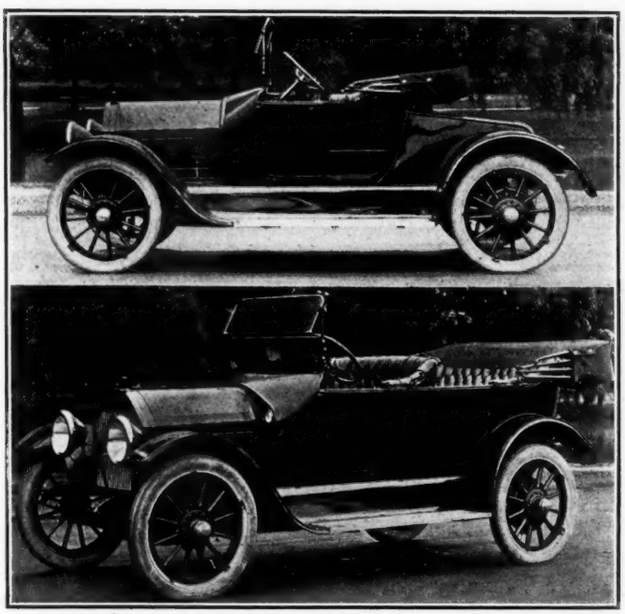
1914 Hupmobile Announced

DETROIT, MICH., Sept. 12.—The Hupp Motor Car Co., Detroit, announces a complete line of four-cylinder models for 1914 which are practically the same in appearance and general mechanical construction as in the previous year. The small model has been discontinued and the model 32 will be the only four-cylinder type offered. On this chassis are mounted the four-passenger touring, six-passenger, roadster, three-passenger coupé and delivery car bodies.

The greatest change in the new Hupps is the equipping of an electric cranking and lighting system of Westinghouse make which is in-built into the power plant, the latter showing no changes except those modifications necessitated by this electric system installation. The ignition system is independent of the latter. However, the purchaser is given the option of the electric equipment, the price on the four-passenger touring and roadster types being $1,050 without and $1,200 with the lighting and cranking together with demountable rims. The six-passenger type is quoted at $1,200 and $1,300 for corresponding equipment. The coupé is furnished only with the electric system and is priced at $1,350. A number of body refinements are found in these new Hupmobiles.

—

SAN FRANCISCO, CAL., Sept. 14—An official invitation has been sent from the president of the Exposition at San Francisco to the president of the International Petroleum Commission, which meets in January, 1914, in Bucharest, Roumania, to hold its annual meeting for 1915 in San Francisco. This meeting will be part of the great meeting of the petroleum industries of America, where the foremost petroleum technologists and scientists of the world will congregate.



TWO OF THE 1914 BODY TYPES

Upper illustration shows the King roadster. The lower one shows the five-passenger touring car. Note the clean running boards and neat-appearing cowl.

The Automobile

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Cyclecar Considerations

IN several European countries where the cyclecar movement has attained considerable moment the reason is invariably asked why the low-priced real automobile of today does not meet with the requirements of all buyers and consequently what is the necessity for the cyclecar movement. The necessity for the cyclecar movement originated with the prospective buyer who has but a limited amount of money to spend each year. This buyer wants a vehicle of low operating cost that will make 50 or 60 miles to the gallon of gasoline of low tire cost. The amount of original outlay is not so important a consideration. There are many instances of where a higher original price is paid for a cyclecar than for a full-fledged automobile.

With all Europeans cost of maintenance and operation are prime considerations and American builders, looking to increasing their European export trade, must keep economy of operation in consideration. There is a very large percentage of foreigners living on annual allowances. They must live within these limits, and hence, operating cost receives more consideration.

With the European maker constantly reducing his motor sizes and cutting his car weight in order to give greater economy of operation, it is necessary for the American builder to give consideration to these same factors in his machines intended for the export trade.

With the growing international character of the business carried on by the larger American firms, considerations of this kind are of the greatest necessity.

The Eventual Gearshifter

TODAY we stand where the trails all intersect: Straight ahead leads one, to the right another, to the left a third and other trail indications lead off at divers angles.

Today we do not know which trail to follow. One enthusiast of the automatic gearshift says that the electric will be the eventual one; an equally enthustiastic supporter of the movement places his confidences in the pneumatic; and scarcely have the arguments of these two been heard that a third comes to the front proclaiming the merits of the combination outfit mechanical and either electrical or pneumatic.

Today all three types are giving success, but it must be acknowledged that the electric type has received first call with several makers. The electric has received the call because people are thinking electrically in the automobile world today; electric starters, electric lights, talked-of electric transmissions and but an intermediate step to electric gearshifters.

Should the electric gearshifter come, and some form of gearshifter is bound to come, then it would seem that history will repeat itself and that a page might be torn from railroad experience in which electricity is used to do the track switching in large yards where the switch moving is centralized in a tower controlled by one or two workmen. In this switch work, which must be positive, positive to personification, the electric motor has been installed, it being considered the most positive prime mover possible for such installation work. The electric motor drives a form of worm which is as positive in working the switch as is a worm in driving a back axle. Railroad engineers have experimented with other forms of electrical force but have finally adopted the motor as the one that equals in positiveness the moving by the human arm and hand.

With gearshifting a positive movement is necessary. In fact, gearshifting must be the personification of positiveness. It will not do to have the gearshifter fail on a steep hill, fail at a dangerous railroad crossing, or fail when overtaking another car at some critical road condition. The gearshifter must be positive; positive 100 times out of every hundred.

Naturally such 100 per cent. efficiency cannot be expected in the early chapters. It never has been present in other pioneering and must not be expected in this particular field.

The feasibility of using the electric starting motor makes the system all the more fascinating. The electric motor is now in use and its duty as a cranking motor leaves it always free to be used whenever gearshifting is necessary. The two fields of operation do not overlap. The starting motor has more than enough power for the gearshifting work. In fact, such new duties would but be adding to its efficiency. The field of application in this particular work is an appealing one and railroading offers a very good opportunity for studying the feasibility of this particular form of application.

Car builders are coming more to consider the electric equipment of their product as a part of the power unit and not merely as an accessory. With the growth of this view comes the better correlation of the starter, lighting system, ignition and gearshift.

London Assured of 28-Cent Motor Fuel

Lamploughs Process Can Turn Out 40,000,000 Gallons Per Year at That Price According to Chemists

LONDON, Sept. 16—*Special Cable*—The Lamploughs process for manufacturing motor spirits from tar oils and from which source it is estimated that 40,000,000 gallons per year can be manufactured and sold at 28 cents per gallon, has during the past week, been considered satisfactory for the manufacture of motor spirit from creosote oil, expert chemists who have been investigating the possibilities of using this process, being unanimous in this conclusion.

To date there has only been an experimental plant in actual operation in which the Lamplough process is used, but a larger plant is being erected at the present time.

This process consists in decomposing a tar oil or creosote oil with steam. The oil and steam flow through a series of heated tubes containing nickel rods. The water decomposes in the presence of the heated nickel and the hydrogen in its nascent state combines with the oil, bringing about a synthetic action, and producing motor spirits.

Shale gas oil with a specific gravity of 0.860 produced motor spirits with a gravity of 0.760, and the yield of motor spirits is practically 43 per cent. of the value of the original oil.

At the recent imperial motor transport conference held in this city the shortage of fuel received major attention, and the utilization of tar and tar oils was one of the subjects that came in for maximum consideration.

Synopsis of Previous Developments

The idea of cracking had been extended during the past few months from heavy hydrocarbon oils to the distillates obtained from coal. When coal is subjected to destructive distillation it breaks up into gases, tar, and ammonia liquor, which are volatilized and leave behind a residue of coke. The tar so produced varies largely in its character with the temperature at which the carbonization has been carried on, the nature and condition of the coal, the form of retort and other factors; but it can be classified under two great headings: 1—Tar, the bulk of which has been distilled at temperatures above 800 degrees Centigrade, and 2—tar the bulk of which has been distilled below this temperature. Class 1 includes the tar made in horizontal and inclined retorts during ordinary gasworks practice, while class 2 consists of the tars from vertical and chamber retorts and low-temperature processes.

The higher-temperature tar is benzenoid in its character, and contains as its chief constituents benzine, toluene, carbolic and cresylic acids, naphthalene and anthracene, together with pitch containing much free carbon. All these hydrocarbons belong to the ring form of structure, are high-temperature products, and when sufficiently heated to decompose, break up chiefly to methane, hydrogen, and carbon. This form of tar can not, therefore, be cracked profitably, and the only possible treatment for it for the production of motor spirit is to distil off the benzine and toluene, which are the valuable portions for this purpose, and then to take the oil fractions and distill them through a column of red-hot coke, when a small additional quantity of benzine and toluine is formed by the decomposition of the carbolic and cresylic acids in contact with the carbon surface. The cost of doing this, however, is prohibitive, and only the fractions distilling from the tar direct can be reckoned upon. Although something like 15,000,000 tons of coal are carbonized annually for gas making in England, it is only the largest works that distil their tar, and the quantity available for motor spirit would only be about 50,000 gallons per annum.

With vertical retorts a large percentage of the tar is distilled at a lower temperature and becomes more paraffinoid in character, a slightly larger fraction being fitted for motor spirit; but at present such tars are generally mixed with those from horizontal retorts and are not available for separate distillation. Coke-oven tar is also of this character, and by scrubbing the gas with heavy oil to wash out the benzine vapor and distilling the tar as much as 3 gallons of distillate fitted for use as motor spirit can be obtained per ton of coal.

True, low temperature tars of the character yielded by destructive distillation below 500 degrees Centigrade are even more paraffinoid in character, and several processes have been brought forward lately for which it is claimed that about 3 gallons of motor spirit can be obtained by direct distillation of the tar from a ton of coal, and further 2 to 5 gallons by cracking the naphtha distillates from the tar. The latter claim is a somewhat doubtful one, but has been seized upon by the advocates of such processes, who boldly speak of 7 gallons of motor spirit per ton from any small coal. In considering such claims, however, it should be remembered that although there might be a few coals in England which, by careful treatment, fractionation of the tar, scrubbing of the gas, and cracking of the suitable distillates, might be made to yield this quantity, the cost of treatment probably outweighs the advantages.

At the present time there is no commercial process working on a large scale which will yield more than 3 gallons per ton of coal carbonized that could be obtained by coke-oven practice, and the total amount of benzine so recovered would amount to about 8,000,000 gallons per annum.

Consumers Warned Against Bad Benzol

THE old adage that it is an ill wind which blows nobody any good is, as a general rule, accurate, and, taking it in the converse aspect, perhaps there are few good winds which do not carry with them a certain amount of ill. So it is in this question of benzol motor spirit production in England which we have taken in hand, and every now and again we come across some phase or feature which is not quite as pleasing as one would wish. In the present instance it is necessary for us to issue a warning to those of our readers who are buying benzol for experimental purposes or for direct usage. Unfortunately, in the northern part of the country especially, there are a number of people offering for sale very imperfect spirits of the benzol group, and stating that they are just the same as those described and recommended by *The Motor*. We have been assured by competent people that in some cases the spirits offered have been no more than 50 per cent. benzol. Even with 90 per cent. benzol there is, unfortunately, as yet no actual criterion of purity.—From *The Motor*.

Importers' Salon to Be January 2-10

Mitchell 1914 Announced—Chicago Trucks Will Carry Fenders—State Registration Figures Large

NEW YORK CITY, Sept. 11—The Importers' Automobile Salon will be held in Hotel Astor, in the grand ballroom January 2-10 inclusive, this date being selected at a meeting of the importers held today at which officers for the ensuing year were elected as follows: President, E. Lascaris, DeDion-Bouton; Vice-President, T. Adams, Lancia; Secretary, S. K. Jelsen, Mercedes, and Treasurer, F. Sewell, Minerva.

Twelve importers will exhibit as compared with eleven exhibitors in January, 1913. The makers to be represented are: DeDion-Bouton, Renault, Panhard, Mercedes, Isotta, Lancia, Minerva, Benz, Peugeot, English Daimler, Delauney-Bellville and Italla. In addition there will be a goodly representative of body builders including Holbrook, Demarest, Brewster, Burr, and Moore & Monger.

The importers will hold their annual banquet in the grand ballroom in the midst of the exhibits on the evening of January 2 at the close of the exhibition of the day.

MILWAUKEE, WIS., Sept. 16—Dealers who exhibited cars and trucks at the Wisconsin State Fair, September 8 to 13, say they feel well repaid for their efforts. Wholesale as well as retail sales were larger than at any previous fair, one concern reporting the actual sale of 137 cars, of which 110 were to agents throughout the state.

Slight Changes in Mitchell for 1914

RACINE, WIS., Sept. 16—The preliminary 1914 announcement of the Mitchell-Lewis Motor Co., Racine, Wis., shows a continuance of the new models adopted at the beginning of the 1913 season, with slight changes. There are two sixes and a four-cylinder car in the list; the seven-passenger six, listing at $2,350; the five-passenger six, listing at $1,895, and two-passenger six at the same price; and a four listing at $1,595. All motors are of the T-head type, cast in pairs, with 4 1-4-inch bore and 7-inch stroke, excepting the $1,895 car, in which the choice of a 6 or 7-inch stroke is given purchasers. For 1913 the list prices were $2,500, $1,800 and $1,500. All 1914 motors have tungsten valves and Remy lighting, ignition and starting devices. The big six has a 144-inch wheelbase and 36 by 5-inch tires; the light six, 132-inch wheelbase and 36 by 4 1-2 tires and the four 120-inch wheelbase and 4.5-inch tires. For 1914 the Mitchell returns to the full-floating rear axle design, and Timken roller bearings are used in both front and rear axles.

Trucks to Have Fenders

CHICAGO, ILL., Sept. 15—All Chicago motor trucks and delivery wagons will have to be fitted with fenders within 90 days according to an ordinance just passed, though where the truck users are to purchase them the city has not stated, nor what the real source of the sudden inspiration to require the new fittings.

The ordinance reads as follows:

> It shall be unlawful for any person, firm or corporation to use and operate within the city of Chicago any motor car or truck for the purpose of conveying therein bundles, parcels, baggage, or wares, merchandise or other similar articles unless said auto car or truck is provided with a fender, as in the case of street cars operated and used within said city, of such design as may be approved by the board of inspectors of public vehicles.

This ordinance if it stands as quoted and enforced, will work a real hardship to truck owners of Chicago, for there are few if any tried out fender devices for sale for motor trucks, and it will take at least 6 months to develop and perfect such devices and several months more to perfect business organizations that can manufacture and furnish such products. Meanwhile the owners will be violating the ordinance or will have to construct their own design of fenders, which may or may not be effective, and which may easily be a menace rather than a life-saving idea. To have the inspectors pass on every truck in Chicago individually—as would be an almost necessary case on account of the necessarily home-made devices—would be an endless job, and great trouble and expense.

Not to be done in haste, as a sudden inspiration from some no doubt well-meaning individual with an idea, the ordinance as it stands is entirely impracticable of application, and it is a question whether the extra length and low obstruction of a fender as on street cars in any case would not be more of a menace than trucks as they are. Mayhap the idea may be changed to take in a guard in front of each wheel instead of an obstructing fender, as Chicago streets are too congested now without adding length to the present multitudinous number of vehicles.

Also are motorcycles that carry bundles, and touring cars identical with pleasure vehicles, to have fenders? There is much to be worked out in the new ruling.

Papers Prepared for Electric Convention

BURLINGTON, VT., Sept. 17—*Special Telegram*—Members of the Electric Motor Car Club of Boston, together with a number of others from all over New England identified with the sale of electric vehicles for pleasure and commercial use reached here today, some in a special train from Boston, and others in motor cars to attend the annual convention of the New England section of the National Electric Light Association which began here today. The headquarters of the convention was at the Vermont hotel, with the entertainment features taking place at the Algonquin club. Many of Vermont's prominent citizens were on hand to greet the visitors and there were more than 100 registered here today for the 3 days' meeting.

Papers have been prepared on various topics of interest to the men identified with electric power and its kindred uses, among them, that of feeding out current to motor vehicles. President Day Baker and Vice-President E. S. Mansfield of the Boston organization were appointed on the reception committee on their arrival. The convention will end Friday evening. Papers have been prepared, each of which will be carefully discussed, as follows:

"Problems of Central Station Managers in Cities of Less than 5,000 Inhabitants," by A. B. Marsden, Manchester, Vt. "Principles Governing Central Stations in Line Extensions and Various Rulings of Commissioners Thereon," by Alex. Macomber, C. H. Tenney Company, Boston.

"Co-operation of Allied Electric Industries," by S. St. John Morgan, Westinghouse Company, W. J. Keenan, Petingell-Andrews Company; J. G. Gilliland, N. E. Eng. Company, and Francis A. Gallagher, Narragansett Electric Lighting Company.

"Some Phases of the Merchandizing of Electric Appliances," by W. G. Stetson, The Edison Company of Boston. "The Value of the Electric Vehicle to the Central Station," by W. H. Snow and David W. Deaman, New Bedford Gas & Edison Light Company.

"The Relation of the Central Station to Its Customers," by J. T. Shannon, The United Electric Light & Water Company. "Lamp Voltage and Socket Voltage," by Henry Schroeder, General Electric Company.

Nebraska Registration Nears 50,000

LINCOLN, NEB., Sept. 16—A total of 37,939 automobiles were registered with the secretary of state up to January 1 of this year. Since that time there have been nearly 7,800 cars added to the lengthy list. Returns by counties show that for the compilation made on the basis of 1912 reports Douglas county led with 2,775 and Lancaster county was next with 1,054 cars. Counties from which more than 500 cars were registered are shown in the following list: Adams, 961; Boone, 523; Buffalo, 677; Burt, 691; Butler, 705; Case, 825; Cedar, 645; Clay, 911; Colfax, 516; Custer, 646; Dawson, 540; Filmore, 693; Gage, 958; Hall, 730; Hamilton, 782; Madison, 607; Kearney, 771; Nemaha, 687; Nuckolls, 560; Otoe, 630; Polk, 698; Richardson, 628; Saline, 650; Saunders, 955; Seward, 940; Washington, 742; Wayne, 512; Webster, 524.

July Automobile Exports High

WASHINGTON, D. C., Sept. 17—*Special Telegram*—One thousand seven hundred and twenty pleasure cars, valued at $1,632,641 and forty-four commercial cars valued at $103,612, together with parts valued at $394,850 were exported during July. In July a year ago the exports were 1,557 pleasure cars valued at $1,546,170, seventy-eight commercial cars valued at $156,458 and parts valued at $394,296. During the seven months ending July last 16,528 pleasure cars valued at $16,610,084 and 662 commercial cars valued at $1,150,639, and parts valued at $3,530,777 were shipped abroad. The combined shipments of pleasure and commercial cars during the same period of 1912 amounted to 15,418,172 together with parts to the value of $2,893,753.

NEW YORK CITY, Sept. 17—The annual outing of the Big Village Motor Boosters at Fred Wagner's farm on Long Island was held yesterday, tennis, baseball and other games and sports being indulged in. A clambake and dinner, followed by the presentation of the prizes, concluded a very pleasant day.

To Manufacture Cyclecars in Minneapolis

MINNEAPOLIS, MINN.—By October 1 there will be a factory in this city to manufacture small automobiles that will sell for less than $400. The company is to be known as the Continental Engine Mfg. Co. and will be located at 14th avenue and the Northern Pacific road. This company has been located in Chicago and Dallas City, Ill.

Bay State Has Six New Automobile Laws

Forty Bills Introduced in Legislature During Past Year—One Truck Law Passed—Regulates the Speed

BOSTON, MASS., Sept. 13—The Secretary of the commonwealth has issued the Blue Book containing the acts and resolves passed by the Massachusetts legislature this year, and it is now possible to learn just what measures were passed in which motorists were interested. Out of the number of measures introduced, totaling about 40, affecting motor cars, trucks and motorists, there were eleven laws passed that may be put under this head. Some of them are a bit remote, as, for instance, the law punishing by a fine of not more than $50 or a jail sentence of 30 days any one who throws glass or other substances on the highways. The regulation of sightseeing buses in Boston has been taken away from the street commissioners and handed over to the police commissioner at the request of the former. The erection of garages has been placed under the street commissioners in that city. Garage owners may now place a lien on motor cars for storage when the owner does not pay. Also insurance companies may insure owners against the loss of use of their cars.

One Law Is Favorable to Automobilists

That leaves six laws pertaining to the operation of motor vehicles, and when one considers all the harsh measures presented it is a good record for the men who fought for the motorists this year. One law favors the motorists, for it takes away from the penalty clause in the motor act the minimum fine. Motorists have been fighting for this for some years. Under the old law a judge had no alternative, if a man was found guilty, but to fine him at least $10. Now there is no minimum fine and the judge may place a case on file. On the other hand the reckless driving clause has been amended so that it is possible for a judge to send a man to jail for any term from two weeks to two years for a first offense if convicted of driving under the influence of liquor, racing, or going away without stopping and making himself known after an accident. The law has been amended so that non-residents are included in the provision where a license may be suspended or revoked. The law relative to passing street cars on the right was amended permitting it. Then there is also the law requiring that any driver figuring in an accident must send a report of the accident to the Massachusetts Highway Commission. That completes the list of pleasure car laws.

There was but one truck law passed. This regulates the weight and speed at which such vehicles may be used on the roads. The committee representing the motorists made a fight against the original bill drawn by the Highway Commission, with the result that a compromise bill was secured that may well be adapted to other states. In comparison with the Maine law the Bay State measure is far more liberal, but the original Massachusetts law was to be similar to the one passed in Maine.

Truck Weight Limit Raised to 14 Tons

The weight limit was put up to 14 tons, including the vehicle, which is a very fair limit. Then the section relative to clamps, etc., digging into the road was worded so that chains and tires that have spaces between the rubber are eliminated. The fine provision, too, was changed, from reading "not less than $10 nor more than $500," which would mean a fine in every conviction, and the limit by some judges, to a section reading "not more than $100," so that a case may be placed on file, while the drop from $500 to $100 is considerable. Bridges, too, must be posted as to speed and weights. The district of Greater Boston is exempt, which includes cities and towns within a radius of about 15 miles of the Hub. As more than 50 per cent. of the trucks are used and owned in that area it was a great concession. The other bill put in by the Highway Commission at the same time, calling for a fee for trucks from $5 to $25 instead of the flat $5 paid now, was the center of attack by the motor committee, and this was beaten. But the speed and weight bill drawn along lines favorable to the makers of trucks was not attacked. This bill reads as follows:

Section 1—No traction engine, trailer, motor or other vehicle shall be operated upon or over a highway or bridge in any city or town in this commonwealth, nor shall any object be moved over or upon any such highway or bridge, upon wheels, rollers or otherwise in excess of a total weight of 14 tons, including vehicle, object or contrivance and load, without first obtaining the permit mentioned in section three of this act from the authority or the authorities therein mentioned; nor shall any vehicle be operated or contrivance moved upon or over said highways or bridges which has any flange, rib, clamps or other object attached to its wheels or made a part thereof, which will injure, cut into or destroy the surface of the highway for a considerable depth, and in the towns of the commonwealth outside of the metropolitan parks or sewage district no such engine, vehicle, object or contrivance for moving heavy loads shall be operated upon or moved upon or over any such highway or bridge the weight of which resting upon the surface of said highway or bridge exceeds 800 pounds upon any inch in width of the tire, roller, wheel or other object, without first obtaining said permit, unless such highway is paved with brick, block, sheet asphalt, concrete pavement or surface. The owner, driver, operator or mover of any such engine, vehicle, object or contrivance over said highway or bridge shall, unless relieved from liability in said permit, may be responsible for all damages which said highway or bridge may sustain as a result of said action on his part and the amount thereof may be recovered in an action of tort by the authority or authorities in charge of the maintenance or care of said highway or bridge, or by the authorities of the town, the Massachusetts Highway Commission, or the county commissioners, which have charge of the highway or bridge which is injured.

Section 2—No steam traction engine, with or without trailers, and no motor truck carrying a weight in excess of four tons, including the vehicle, shall be operated upon any highway or bridge in this commonwealth at a speed greater than 15 miles an hour, and no such vehicle carrying a weight in excess of six tons, including the vehicle, shall be operated upon any such highway or bridge at a speed greater than six miles an hour when such vehicle is equipped with iron or steel tires, nor greater than 12 miles an hour when the vehicle is equipped with tires of hard rubber or other similar substance.

Permits Required for Weights Over 14 Tons

Section 3—The Massachusetts Highway Commission, county commissioners, superintendents of the streets, selectmen, or road authorities having charge of the repair and maintenance of any highway or bridge in any of the towns in the commonwealth are hereby authorized, upon proper application in writing, to grant permits for the moving of heavy vehicles, loads, objects and structures in excess of a total weight of 14 tons, over said highways and bridges, and for operating or moving over any highway or bridge in any town in the commonwealth outside of the metropolitan parks and sewage districts, any engine, vehicle, object, or contrivance, the weight of which resting upon the surface of said highway or bridge exceeds 800 pounds upon any inch in width of tire, roller, wheel or other object, which permits when duly granted shall authorize such movement. Said permits may be general or may limit the time and the particular roads and bridges which may be used, and may contain any special conditions or provisions which in the opinion of the authorities granting the same are necessary for the protection of said highways and bridges from injury. The authorities that have charge of any such bridge are hereby authorized to make regulations regulating the speed of any of the vehicles mentioned in this act passing over said bridge to a speed not to exceed six miles an hour, provided that notice is posted at each end of the bridge affected by such regulation and the load capacity of the bridge is stated therein.

Section 4—Any person violating the provisions of this act or the regulations made or permits granted under authority thereof shall be liable to a fine of not more than $100 dollars for each and every offense, and such fines shall be paid into the treasury of the commonwealth for use on the State highways or bridges when State highways or bridges are injured and into the treasury of the city, town or county when any highway or bridge is injured which is under the care of said city, town or county, for use on the highways of said city, town or county in addition to any other moneys that may be available for that purpose.

Previous Laws Not To Be Affected

Section 5—Nothing in this act shall affect the provision of section 31 of chapter 52 of the revised laws or shall authorize the passage of heavier vehicles or loads over bridges and highways than are now authorized by law, or in any way change or increase the liability of the commonwealth or of any county, city or town to pay for any damage or injury to any person or property.

Some idea of the laws not passed. A number of which seemed good measures, follow:

112—Mayor Fitzgerald of Boston petitions that part of fines and fees be expended upon Metropolitan and Boston parks.

114—Representative Giblin petitions for a commission to investigate the whole motor industry.

115—Bill to prohibit equipping a car so that rear lights may be extinguished from the dash, or any seat.

116—Required that whoever was convicted operating a car under the influence of liquor never could have another license.

178—Similar to 115 on extinguishing rear lights.

255—Increasing truck fees from $5 flat to $5 to $25.

256—Highway commission petitions to make the speed limit a flat rate of 25 miles an hour.

325—Mayor Fitzgerald petitions that all fines be turned back to the cities and counties instead of to the State for road maintenance.

585 and 1361—Petitions that certain kind of signaling devices be put on all motor cars.

688 and 994—Petition to have horse drawn vehicles carry lights at night in all places instead of being exempt in cities.

810—Petition by the A. L. A. to be allowed to erect sign boards through the State.

993—Petition to compel motor cars to come to a stop 15 feet away from street cars that were stopped.

995—Petition to increase the Highway commission inspectors by forming motor cycle squad to stop speeding on State highways.

1269—Petition that owner of a car should be responsible for all damages done by his car when driven by another.

1284—Petition that person driving a car in excess of eight miles an hour who should kill a person should be deemed guilty of murder in the second degree.

1362—Petition that all drivers should stop when nearing a street car not in motion.

1363—Increasing the age for drivers from 16 to 18 years.

1558—Petition that number plates and seals be valid as long as the car does not change ownership.

1559—Petition to decrease the registration fees.

1560—Petition to have horse drawn vehicles pay a fee as well as trucks.

1561—Petition that not having a license charge must be placed on file.

1562—Petition to eliminate the 10 days clause for non-residents.

1743—That 50 per cent. of fees and fines go to the cities.

A.A.A. for Reciprocity

At Buffalo 2-Day Session Association Officials Endorse Congressman Adamson's Bill for Interstate License

BUFFALO, N. Y., Sept. 12—At its 2-day session of the executive committee held here yesterday and today the American Automobile Association officials endorsed Congressman William P. Adamson's bill regulating the inter-state use of motor vehicles which in brief says that:

"No person who shall have qualified by complying with the laws and regulations of the state, territory, or district of his residence to use and operate such vehicle or vehicles (self-propelled) shall be required in any other state or territory or district into which he may go for business or pleasure to make any additional registration or take out any additional license in order to use or operate any such machine."

This is an opening shot against all forms of non-resident registration of motors, in a word, it amounts to practically the same as federal registration so far as inter-state privileges are concerned. The A. A. A. has been a pioneer on federal registration but heretofore its efforts have come to naught.

The meeting also saw the first draft of the uniform traffic regulations prepared by a special committee, the chairman of which is Dr. H. M. Rowe, president of the Automobile Club of Maryland. When the report is completed the A. A. A. will recommend the regulations to its 500 odd clubs in all parts of the country.

Grade crossings abolishment and efforts to lessen this menace to increasing roads travel will be taken up by a committee the head of which is Preston Belvin, president of the Virginia State Automobile Association.

Upon invitation, Dr. E. Stagg Whitin, executive chairman of the National Committee on Prison Labor, was present, with the result that there will be co-operation between the committee and the A. A. A. in furthering the employment of prisoners in roads building.

A part of the meeting was a motor trip in Erie County, over some excellently constructed roads, vitrified brick, concrete, asphalt, and oiled macadam being included.

The dates for the annual meeting in Richmond, Va., were set for December 1, 2 and 3.

Cincinnati Races a Success

CINCINNATI, O., Sept. 14—The Cincinnati Automobile Club pulled off its first dirt-track race meet at Latonia, Ky., just opposite this city, Saturday, September 13. A number of the advertised star dare-devils did not take part, but financially the events proved a success. Over 5,000 speed fans turned out. The receipts will go toward defraying the expense for the annual orphans' outing. Ralph Mulford did not show up while Ralph De Palma withdrew at the last moment. One accident took place. Nick Nickels smashed up his $17,000 Fiat car on the sixty-seventh lap of the 100-mile race.

The 100-mile race went to E. V. Rickenbacker, who handled a Mason Special. Fred Radina, driving Barney Oldfield's old Cino, led for 97 laps until a wheel broke.

Philadelphia Speedway Assured

PHILADELPHIA, PA., Sept. 13—That the proposition to construct a 2-mile motor speedway course adjacent to Philadelphia will soon assume definite shape is evidenced by the announcement that options have been secured on more than 500 acres of land in the Old York Road section above Willow Grove. Prominent Philadelphia and suburban motorists are behind the project and a systematic campaign will be waged to secure a sufficient membership in the Philadelphia Automobile Speedway to guarantee its successful consummation. Tentative plans provide for a speedway 2 miles long, 60 feet wide on the straightaways and 75 feet on the turns.

Burman Makes Fast Time at Milwaukee

MILWAUKEE, WIS., Sept. 16—Bob Burman drove his 300-horsepower Blitzen Benz No. 2 around the 1-mile dirt track, State Fair park, in 48:50 on Saturday, September 13, cutting 3:50 seconds from his former mark of 52 flat, made in 1911. In a second trial, Burman did the mile in 49 flat. The records will necessarily be classed as unofficial, as the timing was done with stop watches. These time trials and few other well known hippodrome events, including a motor polo match on the track, formed the great race meet, billed by the Wisconsin State Board of Agriculture as the feature of the last day of the annual state fair.

Johnson and Chevrolet Leave Republic

DETROIT, MICH., Sept. 17—*Special Telegram*—T. S. Johnston, general sales manager of the Republic Motor Co. of Michigan, has severed his connection with the concern. A similar action has been taken by Louis Chevrolet, who has also been identified with these interests since their formation. The Republic controls the Chevrolet Motor Co., which recently removed from this city to Flint, Mich.

Goodyear Sales Gain 34 Per Cent.

NEW YORK CITY, Sept. 17—Sales of the Goodyear Tire & Rubber Co., in July and August, showed a gain of 34 per cent. over the same months in 1912. Sales for the fiscal year to date are 33 per cent. ahead of last year.

The Goodyear company is having no more trouble with labor and has had none since early in the spring. Operations are now on a basis of 85 per cent. of capacity. August and September always represents the slack season for the company, as inventories are taken during those months and the necessary factory repairs are made in preparation for the fall rush.

Last year the company paid a dividend of 12 per cent., which consisted of a single disbursement at the close of the fiscal year. Present plans call for a dividend at the end of this year at least as large as that of 1912.

Lozier Stockholders Subscribe $525,000

DETROIT, MICH., Sept. 17—*Special Telegram*—Additional preferred stock of the Lozier Motor Co., to the extent of $525,000, has been subscribed by present holders of the concern's stock to take care of greater manufacturing operations during the coming year. The half million of new money is to be immediately available.

NEW YORK CITY, Sept. 16—Dyer, Dyer & Taylor have issued a license to the W. H. McIn-tyre Co., Auburn, Ind.

NEW YORK CITY, Sept. 17—The Motor Truck Club held its monthly meeting last night at the Hotel Cumberland. The evening was spent in discussing the motor parcels delivery. Many of the prominent department store men attended the meeting.

U. S. Tire Sales Increased 30 Per Cent.

NEW YORK CITY, Sept. 10—Announcement of a dividend of 2 per cent. on the common stock of the Rubber Goods Mfg. Co. means that the United States Rubber Co., which owns $16,869,800 of the common stock, will receive the largest income this year from that source in its history. Tire sales of the U. S. Rubber Co. for the first 8 months of the year, or up to Sept. 1 show an increase of 30 per cent over last year. Estimating that the tire subsidiary did a strictly tire business of $25,000,000 last year, the present increase would indicate tire sales for the United States Rubber Co. for the full year, 1913, of well over $32,000,000.

Metropolitan Section to Meet Sept. 25

NEW YORK CITY, Sept. 16—The September meeting of the Metropolitan Section will be held Thursday evening, 25th instant at S. A. E. headquarters.

For this first meeting of the fall and winter series Professor Riebe, of Berlin, one of the pioneer investigators in the subject of anti-friction bearings, will condense the fruits of 15 years' experience into a paper entitled "Review of the Inception of the Ball and Roller Bearing and Their Application in the Automobile Industry."

Proposes National Lighting Bureau

WASHINGTON, D. C., Sept. 16—The creation of a national bureau of public highways and an appropriation of $25,000,000 of national funds in co-operation with the several states in building and maintaining good roads is proposed in a bill introduced by Senator Bankhead, chairman of the Senate postoffice and post roads committee.

The bureau would be directed by a commissioner at $10,000, it would share half-and-half the cost of highway work to be undertaken jointly with the state government. This is substantially the plan formulated by the Bourne good roads commission.

Packard Earns $2,000,000

Company Manufactured 4,400 Machines, 1,000 More Than Previous Season—Last Year's Earnings $2,182,376

DETROIT, MICH., Sept. 17—*Special Telegram*—The report to the stockholders of the Packard Motor Car Co. for the fiscal year ending August 31 shows a net profit for the year of about $2,000,000 after deducting various reserve funds and depreciation. The net earnings for the previous similar period were $2,182,376.00, so that last year's showing was up to the standard. During its fiscal year just passed, the company manufactured about 4,400 machines, which is about 1,000 more than for the year ending August 31, 1912.

Chalmers Earnings $1,273,261

DETROIT, MICH., Sept. 16—The report of the Chalmers Motor Co. for the year ended June 30, 1913, shows net earnings of $1,273,261, an increase of $71,510. Gross earnings were $11,632,951, an increase of $680,564. The 7 per cent. dividend on the $1,500,000 preferred, calling for $105,000 a year, was earned twelve times over. After deducting it the balance, $1,163,261, was equal to 23.3 per cent. on the $5,000,000 outstanding common, which receives 10 per cent. dividends annually.

Schacht Business to Discontinue

CINCINNATI, O., Sept. 14—Declaring that there has been a woeful lack of system in the conducting of the business of the Schacht Motor Car Co., John F. Deitz, who was appointed receiver last April, recommends in a report to the Insolvency Court that the company shut down. He states there is a hopeless tangle of affairs which makes it almost impossible to continue. Just as soon as all work now in the course of construction is completed this in all probability will be carried out. Receiver Dietz reports that it would require an entire reorganization to keep up the manufacturing department.

The repair department was conducted at a loss because too much repair work upon Schacht machines, not included in the guarantee, was done without charge. The auditing and sales departments were not properly organized, with the sales department entirely too expensive, says the report. The company has no 1914 model to put on the market, and in view of this Receiver Dietz thinks it useless to do business next year. The assets of the company were appraised at $243,854.73, and the liabilities were estimated at $150,000 at the time of the receivership. Since then 20 per cent. has been paid on the liabilities. Dietz advises that he be authorized to dispose of the business. The action for a receiver came in an interesting way when directors representing two factions broke from a meeting and raced to the courts. The Schacht Company built an entirely new factory some time ago, and it is one of the biggest, if not the biggest, in the state of Ohio.

Automobile Securities Quotations

A number of small changes occurred in this week's stock prices and they were of small import, the quotations remaining generally on an equal footing with last week's prices.

	1912 Bid	1912 Asked	1913 Bid	1913 Asked
Ajax-Grieb Rubber Co., com	150	175	150	175
Ajax-Grieb Rubber Co., pfd	95	100	95	100
Aluminum Castings, pfd	100	102	98	100
Chalmers Motor Company com,	..	..	100	103
Chalmers Motor Company, pfd	..	..	98	102½
Consolidated Rubber Tire Co., com	13	16	33	35
Consolidated Rubber Tire Co., pfd	50	60	92	95
Firestone Tire & Rubber Co., com	275	280	258	262
Firestone Tire & Rubber Co., pfd	107½	108½	102	104
Fisk Rubber Company, com	..	..	..	..
Fisk Rubber Company, pfd	..	..	..	..
Garford Company, preferred	99	100	92	95
General Motors Company, com	38	39	36	37
General Motors Company, pfd	79¾	81	80	81
B. F. Goodrich Company, com	78	79	28¾	29¾
B. F. Goodrich Company, pfd	109¼	109¾	90¼	91½
Goodyear Tire & Rubber Co., com	333	337	275	285
Goodyear Tire & Rubber Co., pfd	107	108	98½	99½
Hayes Manufacturing Company	..	93	..	..
International Motor Co., com	26	27½	..	5
International Motor Co., pfd	83¼	84¼	10	18
Lozier Motor Company, com	..	..	16	..
Lozier Motor Company, pfd	..	..	..	90
Maxwell Motor Co., com	..	..	2½	3½
Maxwell Motor Co., 1st pfd	..	..	27	31
Maxwell Motor Co., 2nd pfd	..	..	6	8
Miller Rubber Company	135	150	133	137
Packard Motor Company, pfd	105½	107	94½	100
Peerless Motor Company, com	..	..	33	40
Peerless Motor Company, pfd	..	..	87	90
Pope Manufacturing Company, com	36½	38	9	11
Pope Manufacturing Company, pfd	72	74	31	34
Portage Rubber Co., com	..	..	..	38
Portage Rubber Co., pfd	..	..	..	90
Reo Motor Truck Company	9½	10½	10	11
Reo Motor Car Company	22	24	16	17½
Rubber Goods Mfg. Co., pfd	..	..	102	106
Studebaker Company, com	42¼	42¾	23	25
Studebaker Company, pfd	92½	96½	79	81
Swinehart Tire Company	98	100	84½	86
U. S. Rubber Co., com	..	..	63½	64½
U. S. Rubber Co., 1st pfd	..	..	107	108
White Company, preferred	107	109	104	107
Willys-Overland Co., com	..	..	67	68
Willys-Overland Co., pfd	..	..	85	90

Two New Klaxon Suits

NEWARK, N. J., Sept. 15—During the past week two suits have been filed by the Lovell-McConnell Mfg. Co., of Newark, N. J., for infringement of its warning signal patents Nos. 923,048, 923,049 and 923,122, granted May 25, 1909. One of these suits is in the Southern District of New York against the Brady-Murray Motors Corporation of 245 West Fifty-fifth street, New York City, which is said to have offered the Chandler motor car equipped with the Sparton horn. The other suit is in the Northern District of Illinois against the Louis Geyler Co., of 2519 Michigan Boulevard, Chicago, alleged to have offered the Hudson motor car equipped with the same horn.

NEWARK, N. J., Sept. 17—The Lovell-McConnell Mfg. Co., makers of the Klaxon, have completed the installation of their own printing plant to be known as The Klaxon Press. The equipment is thoroughly up-to-date and complete in every particular. A new type face, "Klaxon," especially designed by Goudy, to be used exclusively.

Rockefeller Motor Co. Succeeds Goby

COLUMBUS, O., Sept. 12—The Rockefeller Motor Co. has been incorporated in this city to succeed the Goby Engine Co., Cleveland, O., which concern has had in hand the development of the Goby single-sleeve gasoline motor, which is being developed for automobile uses. The incorporators of the new company include Sterling Newell, T. J. Fay, F. S. Whitcomb, R. F. Dennison and Ellis R. Deihm, the latter three being attorneys. It is rumored that Mr. Goby will not be connected with the new company.

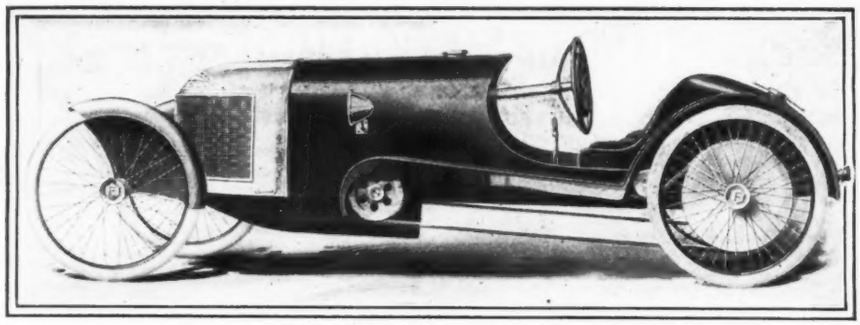
INDIANAPOLIS, IND., Sept. 16—A. H. McIntyre, for years prominent in the automobile accessory business, has been appointed general sales manager for New England by the J. I. Handley Co., which is marketing Marion and American cars. He has established headquarters in Boston.

Market Changes of the Week

Few changes of any importance took place in this week's markets, there being a scarcity of trade. Both electrolytic and Lake coppers rose in prices, the former $0.00 1-2 and the latter $0.00 3-8. Lead experienced a slump of $0.05 per 100 pounds, closing at $4.70. Tin rose $0.25, declining from $42.50 on Wednesday to $42.38 on Friday, and then rising to $4.75, its closing price. Linseed oil dropped $0.01. The rest of the oil and chemical prices remained constant at last week's prices. Tire scrap remained at $0.09 1-2. Bessemer and Open-Hearth steels and the rest of the metal markets remained constant at their old prices.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, lb.	.07½	.07½	.07½	.07½	.07½	.07½	.....
Beams & Channels, 100 lbs.	1.61	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel, ton	25.00	25.00	25.00	25.00	25.00	25.00	.....
Copper, Elec., lb.	.16½	.16½	.16½	.16½	.16 7/10	.17	+ .00½
Copper, Lake, lb.	.16⅝	.16⅝	.16⅝	.16⅝	.16⅝	.17	+ .00⅜
Cottonseed Oil, lb.	8.10	7.98	7.81	7.57	7.26	7.16	— .94
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	.....
Fish Oil, Menhaden, Brown	.33	.33	.33	.33	.33	.33	.....
Gasoline, Auto, 200 gals.	.22¼	.22¼	.22¼	.22¼	.22¼	.22¼	.....
Lard Oil, prime	.95	.95	.95	.95	.95	.95	.....
Lead, 100 lbs.	4.75	4.75	4.75	4.75	4.75	4.70	— .05
Linseed Oil	.53	.53	.53	.53	.52	.52	— .01
Open-Hearth Steel, ton	24.00	24.00	24.00	24.00	24.00	24.00	.....
Petroleum, bbl., Kansas crude	1.03	1.03	1.03	1.03	1.03	1.03	.....
Petroleum, bbl., Pa., crude	2.50	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	.....
Silk, raw Italy	....	5.30	....	....	5.30	....	.....
Silk, raw Japan	....	4.37½	....	....	4.37½	....	.....
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	42.50	42.40	42.38	42.38	42.90	42.75	+ .25
Tire, Scrap	.09½	.09½	.09½	.09½	.09½	.09½	.....

The Cyclecar



Side view of the Economycar, showing long belt drive

Road Tests of Two American Types Demonstrate Their Speed, Comfort and Reliability

THEORY has been replaced by fact in the actual tests on country roads of three makes of cyclecars, each one, as it happens, of the narrow tread type, and all surprising even the designers in the roadability and comfortable speeds possible on rough country roads.

The Economycar of Indianapolis, after a number of preliminary runs, was taken for a trip recently. The car was driven from Indianapolis to Attica, Ind., 83 miles, and return. The entire trip, covering over 200 miles, was made on a gasoline consumption of 6 gallons. Every hill but one was taken on high speed, — about 4¾ to 1 — the one hill where low gear was used being exceptionally steep. The comfort of the car even at high speed was remarkable. The car used has a 38-inch tread which, it is understood, will be narrowed slightly to enable it to run a little better over a dirt road with pronounced wheel and horse tracks, one wheel running in the wheel track and one in the horse track.

Narrow Tread Good in Traffic

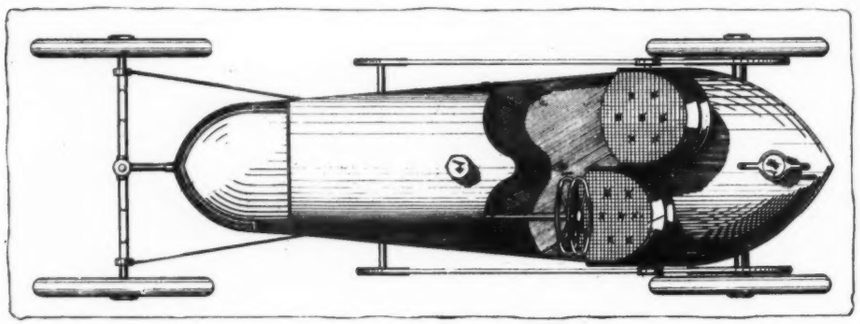
In the report of the run especial mention was made of the time saved by the narrow vehicle in threading traffic, the advantage of the tandem type of seating over the side-by-side being also remarked.

The Economycar uses planetary gearset on a countershaft, a chain running forward to the motor, and belts back to the rear wheels. These are absolutely quiet, and do away with the need for a differential. The car has two speeds. The front axle pivots, and steers by a drum-and-cable steering device which proved exceptionally easy to handle. The car weighs about 460 pounds.

A report has also been received of a cross-country trip from Indianapolis, stated to have been about 20 miles in length, by Harold Eastes of that city, on a cyclecar of his own make traveling at a road average of 30 miles an hour. The car is one being built for manufacture, is of 36-inch tread, but a side-by-side seater, with final chain drive. The wheels are 26-inch fitted with 2½-inch motorcycle tires.

The I. M. P. cyclecar of Auburn, Ind., also received its real test in August when it made the run from Auburn to Island Park and back, a distance of 40 miles in all, with a 325-pound load. This car, it will be remembered, has no axles, their place being taken by twin cross springs. The action of this system was stated to be a surprise even to the designer, and the road speed attained on the roughest roads that could be found on the trip to be far above expectations. The return trip of 20 miles was made in 40 minutes running time. The car did 45 miles per gallon of gasoline. On one occasion, it is claimed, a touring car with the speedometer needle on 45 according to its driver; —who was a stranger, met on the road and questioned later,— was passed and with no discomfort to the riders, though the road was rough.

The general feeling from these three first tests seems to be one of surprise at what the little vehicles can accomplish, rather than one of any disappointment at shortcomings. The reports read as though enthusiasm were being restrained, rather than as merely glowing bursts of publicity.



Plan view of Economycar, showing seating arrangement

Benzol Good for Cyclecars

Every cyclecarist should make a trial of benzol, and we have every confidence in predicting that he will be astounded at the results obtained. In practically every case very satisfactory results will be forthcoming when changing from petrol to benzol if no adjustment whatever is made to the carbureter. Even in this case there will be an increase in the m.p.g., but in order to obtain the best results it is advisable to carry out certain experiments. It will usually be found that the fitting of a slightly smaller jet will produce better running, and this method of adjustment is preferable to increasing the air supply. Reducing the jet will decrease the consumption of fuel, whether it be petrol or benzol.

It is sometimes found necessary to place an extra weight on the float, in order that the level of the benzol may be the same as the original one of the petrol. This is rarely found to be necessary, but if the maximum efficiency is required, some correction in the level should be made. Special provision is made in some carbureters (such as the Solex), for using benzol, and in the case mentioned the float is simply inverted.

The advantages of the use of benzol are already well known to a large number of cyclecar owners, but a recapitulation of the leading points may be of interest to the newcomers to our ranks. Benzol has a higher heat value than gasoline. More air is required for perfect combustion, and the resulting explosion from benzol is not so rapid as from petrol.—From *The Cyclecar*.

M. & S. Differential Displaces Bevel Gears

Claim That New Drive Follows Lines of Least Resistance and Drives Wheel Having Greatest Traction

THE M. & S. Gear Co., Detroit, Mich., has brought out a rear axle differential for automobiles in which gears with spiral teeth cut at an angle of 45 degrees take the place of bevel pinions as used in the bevel-gear differential or spur pinions in spur gear types. Fig. 1 of this differential shows the spiral gear A which fits to the inner end of each axle drive shaft. This gear meshes with two other spiral gears B positioned diametrically at opposite sides. There is another set of these gears B1 which mesh with a similar gear corresponding to A but connected with the other axle drive shaft. Gears A and B are interconnected by two gears C placed in diametrically opposite positions these gears C having their axis at right angles to the gears B.

This practically completes the mechanical makeup of the M. & S. differential, consisting as it does of eight spirally-cut gears. To recapitulate: Two of these are located on the inner ends of the axle drive shafts and the remaining six are mounted in the housing, which carries the large ring gear G, which receives the drive from the propeller shaft.

The claims advanced for the M. & S. differential which shows it different from the bevel or spur type is that with the bevel or spur type the drive is through the line of lowest resistance. In other words, if a car stands with one rear wheel on a slippery spot and the other on a rough surface, and the power of the motor is applied, the wheel on the slippery surface revolves rapidly and that on the rough surface remains stationary. With the M. & S. the direct opposite is claimed to be the case, and experiments are cited which if one wheel of an axle with an M. & S. differential were raised on a jack and the power of the motor turned on, the raised wheel would remain stationary, but the motor power transferred to the wheel not jacked up would cause the car to move forward off the jack. In a word, the M. & S. drives through the wheel of greatest resistance.

There is one other aspect of the new differential, namely, that in turning a corner both the inner and outer wheel aid in the driving but the division of power between the two wheels is in proportion to the distance required to be traveled by each wheel. To explain: If in turning a corner the inner wheel travels 14 miles per hour, and the outer 16, the outer wheel performs one-seventh more work than the inner one. When traveling in a straight line all of the various gears in the M. & S. are idle the same as in a bevel gear type. With the M. & S., if one wheel is elevated from the ground it can be freely turned back or forward with the hand.

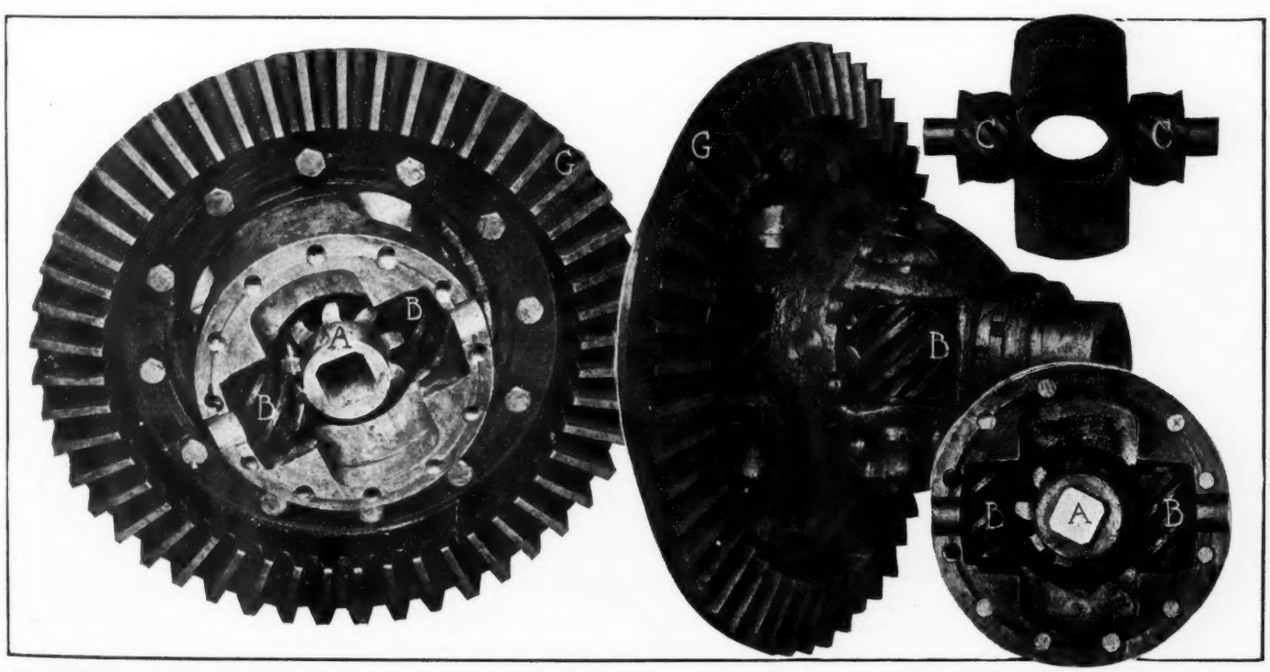
In explanation of its operation W. F. Neuhl, whose paper on this subject before the Detroit Section of the Society of Automobile Engineers was reported in last week's issue of THE AUTOMOBILE, says: "The two axle gears each have rotative powers through tractive distance of either wheel when the car is turning, or one wheel has to travel a longer distance than the other, thereby causing the six gears, namely, four gears B and B1 and two gears C which are anchored in the gear housing to rotate on their axis permitting one wheel to advance proportionate to the retard of the slow wheel. These gears always present the same pulling face when power is applied to the master or ring gear G regardless of differentiation; consequently equalizing power on the turn.

"On the other hand, the conventional type of differential is governed solely by the tractive effort and distance of travel of the wheels.

"The M. & S. differential is automatic the same as the conventional bevel, or spur type and operates forward or backward. The engine can be used as a brake upon the wheels with better results than it can be used on the bevel or spur types.

"The M. & S. differential is standardized and can be adjusted to any car of any size, and installed in any floating axle type in 1 hour's time."

In other words this differential fulfills all functions of the ordinary type and then goes one step beyond by utilizing the rotative moment when it is most needed. Instead of driving the wheel having the least traction that having the greatest is given the more power and instead of any loss due to slipping wheels or on bad roads this is compensated for by the automatic action of the differential.



Arrangement of gears and worms used in the new M. & S. differential. Spiral teeth cut at 45 degree pitch take place of double pinion

BESLEY Triples Capacity—Charles H. Besley & Co., Chicago, Ill., manufacturing grinding and polishing machines in a large works at Beloit, Wis., has broken ground for several new buildings which will triple the size of the Beloit shops. All structures will be of reinforced construction. The Besley company established its Beloit works in 1886. The extensions will make available about 75,000 square feet of additional floor space.

Morgan & Wright's Addition—The Morgan & Wright Tire Co., Detroit, Mich., has prepared plans for another addition to its factory of about 40,000 square feet.

Pharis Tire Adds—The Pharis Tire & Rubber Co., Columbus, O., is adding two new buildings to its plant, one of which will be 100 by 73 feet and the other 22 by 40 feet.

Abbott Ball Co.'s Plant—The Abbott Ball Co. of Elmwood, a suburb of Hartford, Conn., has let contracts for the erection of a one-story addition to the present plant.

Maxwell Sells Courier Plant—In pursuance of its policy of turning unavailable assets into cash, the Maxwell Motor Co. has sold the old Courier plant at Dayton, O., for $50,000.

Kemper Co. Buys Land—Three acres of land have been bought as a site for a factory for the Kemper Ode Gas Engine Co., Albert Lea, Minn. Work is to begin on the factory at once.

Southern Motor Plant Open—The plant of the Southern Motor Co., at the corner of Third and Laurel streets, Texarkana, Tex., was opened recently. This company was recently organized. Motor trucks will be manufactured.

Establishes Warehouse—The Galena Signal Oil Co. of Kansas City, Mo., has established a general distributing agency for the Northwest territory at Superior, Wis. A $15,000 warehouse and office building will be erected immediately.

Accessory Firm Moves—The El Starr Mfg. Co., Milwaukee, Wis., manufacturer of automobile supplies and accessories, has leased the sixth floor of the Wilson Building at 223 Erie street, Chicago, Ill. It will move its entire plant to Chicago.

Elkhart May Have Plant—Elkhart, Ind., may have a new automobile factory. Efforts are quietly being made among business men to raise capital for a plant for the manufacture of an automobile, the patents for which are held by L. T. Upton, of Constantine, Mich.

Stevens-Duryea Factory Branch—The Stevens-Duryea Co., Chicopee Falls, Mass., has announced that it will install a factory branch in Cincinnati, O., with salesroom in the new two-story brick building at Race and Eighth streets, which is undergoing a process of remodeling and redecoration.

Hampton Carburetor's Plant—The Hampton Kerosene Carburetor Co., New York City, has leased a site at the foot of Gordon street, Perth Amboy, N. J., and will build a plant for the manufacture of carburetors and motor appliances. The plant will include a foundry, machine shop, brass-finishing shop and kindred departments.

Establishes Waukesha Factory—The Siebers & Raisch Pattern Works, 686-690 National avenue, Milwaukee, Wis., has established a large branch works in Waukesha, Wis., to serve several of the big manufacturing concerns in the Spring City. Particular attention will be paid to the needs of the motor and aluminum casting works in Waukesha, which now take a high rank among the city's industrial institutions.

Will Move from Racine—It is reported that the Hamilton-Beach Mfg. Co., Racine, Wis., producing electrical appliances and devices, will leave Racine and locate elsewhere. The concern is capitalized at $50,000. Messrs. Hamilton and Beach sold their majority interest in the company about a year ago and have since organized the Wisconsin Electrical Co., manufacturing a line of motor-driven specialties and accessories at Racine.

Yale Muffler Co. Adds—F. A. Tuschen, Milwaukee, Wis., and Andrew S. Scheuerell, Sun Prairie, Wis., who recently purchased the assets of the defunct Yale Mfg. Co., at Oostburg, Wis., and is continuing the manufacture of the Yale silencer for motor cars, are planning to engage more extensively in the manufacture of motor car accessories and specialties, including steel stampings and castings. The new concern is styled the Yale Muffler Co. and the operations are in charge of Mr. Scheuerell. The new program contemplates the erection of one or two new shop buildings early in 1914.

Yale Accessory Co. Continues—The plant of the Yale Motor Equipment Co. at Oostburg, Wis., is now certain to be continued as a factory for the production of automobile accessories and equipment. At the sale of the estate of the bankrupt Yale concern F. A. Tuschen of Milwaukee, Wis., and A. G. Scheuerell of Sun Prairie, Wis., purchased the buildings and equipment for $17,275. The patent rights are included and it is the intention of the new owners to resume operations at once along the lines of the old concern. The feature of the Yale line was a silencer, or muffler, which will be produced in large quantities. The concern will also manufacture horns, cut-outs and other parts. Mr. Tuschen is well known in the motor car selling industry, owning garages at Watertown and Milwaukee and being state agent for the Nyberg.

The Automobile Calendar

Shows, Conventions, Etc.

Sept. 17-18	Cleveland, O., Annual Meeting of the National Brick Manufacturers Assn.
October 13	Philadelphia, Pa., National Fire Prevention Conference Philadelphia Fire Prevention Commission.
Oct. 25	New York City, Electrical Exposition Motor Show. Grand Central Palace.
Oct. 27-28	Chicago, Ill., Convention of Electric Vehicle Association of America.
Oct. 27-28	Chicago, Ill., Fourth Annual Convention, Electric Vehicle Assn. of America.
Dec. 9-12	Philadelphia, Pa., Annual Convention of American Road Builders' Association.
Dec. 11-20	New York City, First International Exposition of Safety and Sanitation, under the auspices of the American Museum of Safety.
Jan. 2-10, 1914	New York City, Importers' Automobile Show, Hotel Astor.
Jan. 3-10, 1914	New York City, Automobile Show, Grand Central Palace.
Jan. 24-31, 1914	Chicago, Ill., Automobile Show, Coliseum and First Regiment Armory.
Jan. 26-31, 1914	Scranton, Pa., Automobile Show, Automobile Assn. of Scranton.
Jan. 31-Feb. 7, 1914	Minneapolis, Minn., Automobile Show.
Feb. 2-7	Buffalo, N. Y., Automobile Show, Buffalo Automobile Dealers' Assn.
Feb. 9-14	Buffalo, N. Y., Truck Show, Buffalo Automobile Dealers' Assn.
Feb. 21-28	Newark, N. J., Automobile Show, N. J., Auto Trade Assn.
Feb. 22-March 5	Cincinnati, O., Automobile Show, Cincinnati Automobile Dealers' Assn.

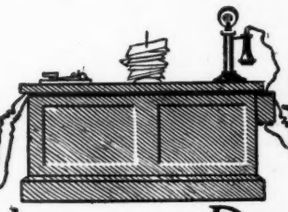
Race Meets, Runs, Hill Climbs, Etc.

Sept. 17-18-19	Norfolk, Neb., Track Race, A. N. Hughes.
Sept. 18	Asheville, N. C., Hill Climb, Asheville Automobile Club.
Sept. 20-21	Detroit, Mich., Track Races, Michigan State Fair.
Sept. 26	San Marco, Tex., Hays Co. Fair Assn.
Sept. 27	White Plains, N. Y., Track Meet, G. T. Long.
Sept. 27-28	Bakersfield, Cal., Track Races, Kern Co. Fair Assn.
Oct. 3	Trenton, N. J., Track Meet, Inter-State Fair Assn.
Oct. 3-4	Oklahoma City, Okla. Race Meet, Oklahoma State Fair Assn.
Oct. 4	Fresno, Cal., Track Meet, Fresno Co., Agricultural Society.
Oct. 4	St. Louis, Mo., Tour, Auto Club of St. Louis.
Nov. 2-3	Los Angeles, Cal., Road Race, Los Angeles to Phoenix, Tex.
Nov. 4-5	El Paso, Tex., Road Race to Phoenix, Ariz.
Nov. 4-5	Los Angeles, Cal., Road Race to Phoenix, Ariz.
Nov. 4-5	San Diego, Cal., Road Race to Phoenix, Ariz.
Nov. 6	Phoenix, Ariz., Track Meeting, State Fair.
Nov. 24	Savannah, Ga., Vanderbilt Cup Race, Motor Cups Holding Company.
Nov. 27	Savannah, Ga., Grand Prize Race, Automobile Club of America.

Foreign

Sept. 21	Boulogne, France, 3-Litre Race.
Sept. 25	Isle of Man, International Stock Car Race.
October 17-28	Paris, France, Automobile Show, Grand Palais, 10 days.
November 7-15	London, Eng., Annual Automobile Exhibition, Olympia.

The Week in the Industry



Engineer — Dealer — Repairman — Garage

PHILADELPHIA'S MUNICIPAL REPAIR SHOP—Philadelphia, Pa., is advertising for bids for a municipal repair shop for the department of public safety, to be erected at 11th and Reed streets, which will form part of the group of buildings owned by the city at that location. The shop will have a frontage of 258 feet on Reed street, with a depth of 115 feet, and will be three stories in height with one mezzanine story. The walls will be of brick, with terra-cotta trimmings. The column, floor and roof construction will be of reinforced concrete, with tarred felt and slag roof covering. A boiler, engine and generator plant will be installed in the first story, also a blacksmith shop will adjoin the main building. A 10-ton traveling crane will be provided for movement of heavy castings. There will be one large electric automobile elevator, also a smaller elevator for general freight purposes.

ROBINSON SUCCEEDS STEARNS—A. S. Robinson has been made manager of the KisselKar agency in Los Angeles, Cal.

WARNER GROSSMAN SECRETARY—P. W. Warner has been elected secretary of the Emil Grossman Co., New York City.

GREEN GROSSMAN SALES MANAGER—S. J. Green has been appointed sales manager of the Emil Grossman Co., New York City.

TAKES MOTZ TIRE AGENCY—R. J. Brine, of the Columbia Top & Tire Co., Boston, Mass., has taken the agency for Motz tires in that and surrounding territories.

MANAGER VELIE CO.—W. Ashley Gray has been chosen vice-president and general manager of the Velie Motor Co., of Missouri, St. Louis.

O'NEILL EASTERN EMPIRE MANAGER—The Empire Automobile Co., Indianapolis, Ind., has appointed A. A. O'Neill Eastern sales manager.

RENAULT'S NEW SERVICE PLANT—The Renault Freres Selling Agency, New York City, recently leased the old Benz service plant in Long Island City.

NEW MINNEAPOLIS MARATHON TIRE BRANCH—The Marathon Tire & Rubber Co. has opened a branch at 1104 Hennepin avenue, Minneapolis, Minn., in charge of O. H. Clay.

VELVET SHOCK ABSORBER IN N. Y.—The Velvet Co., Inc., has been incorporated to handle the Velvet shock absorber in New York City, with headquarters at 74th street and Broadway.

DOTY HAYNES, CHICAGO MANAGER—H. E. Doty has been appointed manager of the Haynes Motor Car Co., Chicago, Ill., which acts as distributor for the states of Iowa, Illinois, Wisconsin and part of Indiana.

NEW SIMMS SERVICE STATION—The Lemke Electric Co., 280-284 Lake Street, Milwaukee, Wis., service station for Splitdorf and Bosch magnetos, has been appointed official service station for the Simms magneto.

MISHAWAKA WANTS TWO VEHICLES—The city of Mishawaka, Ind., will purchase a combination automobile patrol and ambulance and the city clerk at a meeting of the common council was instructed to advertise for bids immediately this month.

MOSELY WITH R. M. OWEN—Wm. B. Moseley, formerly with the Goodyear Tire & Rubber Co., Akron, O., is now in the employ of R. M. Owen & Co., New York City, as traveling representative for the eastern district.

AUTOMOBILE INSURANCE CO. IN MAINE—The Automobile Insurance Co., of Hartford, Conn., has been admitted to do automobile insurance business in the State of Maine. The company has a surplus of $300,000 over all liabilities.

NEW BUILDINGS IN CINCINNATI—The Stevens-Duryea Co. has secured a lease on property in the central part of Cincinnati, O., for a service station. The Velie Co. has also entered the market in Cincinnati and will erect a new building.

GAWTHROP KREBS MANAGER—W. W. Gawthrop has been appointed manager of the newly established Eastern sales branch of the Krebs Commercial Car Co., of Clyde, O., with headquarters in the Abbott Building, Broad and Race streets.

PENNSYLVANIA TIRES MOVE IN N. Y.—The Pennsylvania Rubber Co., of Jeannette, Pa., has leased a large store at Broadway and 63d street, New York City. The entire ground floor of the building is being extensively remodeled for the branch.

SHUTT MANAGES KOEHLER SALES—W. H. Shutt, formerly manager of the H. J. Koehler Sporting Goods Co.'s Boston, Mass., branch, has been made director of sales and advertising. He will make his headquarters at the company's New York office.

APPOINTED BOSCH DISTRIBUTOR—The Lemke Electric Co., 280-284 Lake Street, Milwaukee, Wis., has been appointed Wisconsin distributor and selling agent for the Bosch Magneto Co. The Lemke Company has been official Bosch service station for 18 months.

FEELY EDITOR COLE BULLETIN—The appointment of Paul J. Feely as editor of the *Cole Bulletin*, the house organ of the Cole Motor Car Co., Indianapolis, was announced during the last week. Mr. Feely has been motor car editor of the *Portland Oregonian*, Portland, Ore.

PACKARD CONVENTION ON A CRUISE—Packard dealers from all parts of the country and Canada left Detroit, Mich., recently on the annual Packard cruise. About 200 dealers, salesmen and factory executives were aboard the "City of Detroit II" when it left the dock on its 3 days' voyage to the Soo and back.

NEW INDIANAPOLIS BUS LINE—A motor bus service will be established between Indianapolis and Noblesville, Ind., a distance of 20 miles, by J. W. Ridge, of Sheridan, Ind. Mr. Ridge for 7 months has been operating similar service between Noblesville and Sheridan with excellent results. The new service will cover several small towns.

INDIANA REGISTRATION LARGE—From July 1, when the new license law went into effect, to September 10 the motor license department of the Indiana secretary of state issued 41,341 motor car licenses. About 12,000 were issued in July and 27,000 during the month of August. The issuance of licenses has been delayed owing to the failure of the company having the contract for furnishing the number plates to make prompt deliveries.

"MERCER MAGIC" IN FIELD—The latest house organ to make its appearance in the automobile industry is *Mercer Magic*, published by the Mercer Automobile Co., Trenton, N. J., under the directorship of W. A. Smith, the advertising manager. The initial number of the new publication, which is printed on coated paper, contains an interesting illustrated summary of the noteworthy performances of the racing Mercers in important contests during the last year and in 1911 and 1912. Complete descriptions of its new models are also given.

MOVE FOR CHEAP GASOLINE—The organization of the American Petroleum Society, Pittsburgh, Pa., which has been under way since early in July, has been perfected at a meeting held at the United States Bureau of Mines, Arsenal Park. Thirty-two American national societies had been invited to send representatives, and most of them did so. The society will oppose the combination system of the Standard Oil Co. One of the first objects it seeks to attain is cheaper gasoline, or a substitute in some other by-product of petroleum.

LEE TIRE BRANCH IN N. Y.—The Lee Tire & Rubber Co., Conshohocken, Pa., will establish a tire branch at 1966 Broadway, New York City. The quarters are in the shape of an L, with the base on the street. Plate glass windows from the ceiling to within a foot of the ground admit plenty of light and allow a full view of the interior. The branch will not only do a direct retail business to accommodate the growing local demand, but will also carry a complete wholesale stock that will be available to dealers around New York.

INVENT CARBON REMOVER—J. K. Brasier and J. C. Cushman, of Portland, Ore., chemists of that city, have recently invented a solution that is said will remove carbon accumulation from automobile engines. The inventors conceived the idea that by introducing the solution into gasoline, they would decompose the carbon and upon drying, blow it through the exhaust valve in the form of a very fine dust. Another method of inserting the carbon remover is by running .5 pint through the air valves of the carbureter every other day for 3 days.

NEW PHILADELPHIA SALES BUILDING—A large plot of ground extending 220 feet along the north side of Chestnut street between 23d and 24th streets, Philadelphia, Pa., and having a depth of 100 feet will be improved by the erection of a five-story concrete automobile sales building that will cost approximately $300,000. The site was formerly used as a riding academy and was purchased by a syndicate of investors. Directly opposite, in the south side of Chestnut street, there is at present in course of construction a five-story building to be used for similar purposes, it being understood that three prominent automobile manufacturers will occupy the structure upon completion.

GOODYEAR INDIANAPOLIS HOME READY—The new Indianapolis, Ind., branch of the Goodyear Tire & Rubber Co., is ready for occupancy. It is a four story building and fireproof. It is of white stone, steel and concrete, and 50 by 200 feet in size. Freight and passenger elevators and every modern convenience makes the branch one of the most efficient tire service stations in the world. The basement is for trucks. It is so constructed that a truck of any size can be driven right in and get tire attention of any kind at any time. Presses for applying the solid tires are in this department. The general offices, private offices, salesrooms and adjusting rooms will take up the main floor. The fixtures are finished in golden oak; the lighting system is indirect, and Goodyear interlocking rubber tiles form the floor of the front corridor.

AUTOMOBILES FOR MINE RESCUE WORK — Automobile rescue cars will soon be an auxiliary to the railroad cars now in use in the rescue service of the United States Bureau of Mines. A test car of the automobile apparatus is now being built for the Pittsburgh, Pa., station of the Bureau of Mines, and will be delivered this month. This will be the first automobile ever designed for mine rescue service in this country, although the method has been tried in England, and has proved a success. The automobiles are especially designed for runs to mine disasters of less than 100 miles distance, and it is believed will be the means of saving many lives which might be lost while waiting the arrival of the less mobile rail road cars. In appearance the automobile rescue cards will resemble the automobile used as police patrols, with the exception that along the sides oxygen tanks will be placed, in the rear fire extinguishers will be hung. It will carry axes, lanterns, a pulmotor and first-aid and resuscitation apparatus. The car was designed by J. W. Paul, chief of the rescue service and other engineers and is well adapted for this service.

NEW AUTOMOBILE LINES IN SPAIN—A public twice-a-day automobile service was recently inaugurated between Jerez de la Frontera and Arcos, a town of some 10,000 inhabitants; also in Cadiz Province, Spain. Since its foundation, many centuries ago, Arcos has sat isolated upon a rocky eminence at whose foot runs the Guadalete River. Railways have not approached its limits, and communication with the outer world has been confined to rough highways, over which in modern times uncomfortable horse-drawn coaches have borne passengers by tedious stages to neighboring cities. The journey of 18.5 miles to Jerez under old conditions required 4 to 5 hours; by the up-to-date method now installed the distance is traversed in 1 and 1.5 hours. The present service is operated by two residents of Jerez, who about 3 years ago established, and have maintained with much success, a line of public motors between San Fernando and Algeciras, and the type of car used on that run and found satisfactory has been placed on the new route. The chassis was constructed in the works of the Hispano-Suiza Co., the body being built in the neighboring town of San Fernando. Engines of 40 horsepower drive the machinery. The car is large and roomy, well upholstered, and comfortable. Fares are $1.08 for the berlina or box and 80 cents for the interior seats.

CURTIS NEW MANAGER—H. T. Curtis has been appointed manager of the New England branch of the Invader Oil Co., with headquarters in Boston, Mass.

DITMAN LOCOMOBILE ASSISTANT MANAGER—A. J. Ditman has been appointed assistant manager of the New York City branch of the Locomobile Co. of America, Bridgeport, Conn.

REPRESENTS RACINE TIRE.—The J. C. Coxe Co., 321-327 Fourth Street, Milwaukee, Wis., has been appointed Milwaukee distributor for the Racine Auto Tire Co., Racine, Wis. The Coxe Company represents the Stanley steam car in Wisconsin.

CHAPMAN INDIANAPOLIS WHITE MANAGER—R. W. Chapman, formerly with the National Motor Co., Indianapolis, Ind., is now connected with the White Co., Cleveland, O., and will represent it at Indianapolis as manager of the White Co.

WITH WHITTEN-GILMORE CO.—George H. Proctor, one of the pioneer agents in Boston, who handled the Stanley and the Pullman lines for some years, has accepted a position with the Whitten-Gilmore Company to handle that company's line of Woods electrics.

VAN HARLINGEN RESIGNS—J. M. Van Harlingen, traffic engineering and analysis manager of the International Motor Co., New York City, has resigned, to take effect on October 1. He will enter business on his own account as an expert truck and transportation adviser.

ST. LOUIS ADDS TWO—Two more automobiles were added to the St. Louis, Mo., police department's equipment. The new cars are Dorris machines of the 1500 pound wagon chassis sort and will accommodate twelve persons. The department's garage now houses twenty-three automobiles.

COGHLAN MOON ADVERTISING MANAGER—Raymond G. Coghlan, secretary of the Moon M. C. Co., the New York City agent of the Moon Motor Car Co., East Moline, Ill., has been appointed advertising manager of the parent company. He will handle the work from New York City.

MINNEAPOLIS FIRM MOVES—The Frederick E. Murphy Automobile Co., Minneapolis, Minn., has opened its new automobile warehouse and salesrooms at 1301 Hennepin avenue. The Lozier, Mitchell, Paige and Commerce cars are distributed. The showroom is said to be the largest existing, 83 feet in front, 76 deep and 32 feet high. The building cost $160,000. It has 137 feet frontage and is 144 feet deep, facing 13th street. It is three stories and of white brick and terra cotta. The show cars are swung on a balcony visible from the avenue as well as from inside. The shop, 54 by 144 feet, is on the second floor, as well as a stock room. The third floor will carry 250 cars in stock. A service garage has been opened on the ground floor back of the show room.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

CHICAGO, ILL.—Aerothrust Engine Co.; capital, $2,500; to manufacture automobile engines. Incorporators: J. J. Bellman, G. J. Gilbert.

CHICAGO, ILL.—Auto-Hoist Co.; capital, $50,000; to manufacture machinery. Incorporators: T. Monahan, C. Connelly, C. J. McGinnis.

CINCINNATI, O.—Cincinnati-Velie Motor Sales Co.; capital, $5,000; to deal in automobiles. Incorporators: W. S. Schmidt, C. B. Groesbeck, J. J. Fauth, Elmer Strategus, J. J. Grogan.

CLEVELAND, O.—Falcon Co.; capital, $15,000; to deal in automobiles. Incorporators: J. H. Cassidy, D. C. Meek, M. A. Copeland, C. Verbsky, W. S. Mitchell.

COLUMBUS, O.—Central Auto Vehicle Co.; capital, $10,000; to deal in automobiles. Incorporators: J. K. Kennedy, S. A. Webb, C. M. Addison, W. E. Benoy, A. V. McLaughlin.

DARLINGTON, S. C.—Cash Automobile Co.; capital, $1,000; to deal in automobiles. Incorporators: C. C. Vaughan, G. B. Brasington, J. B. Blackwell.

DAYTON, O.—Dayton Buick Co.; capital, $10,000; to deal in automobiles. Incorporators: L. J. Haughey, J. A. McKenney, A. J. Smith.

DETROIT, MICH.—Davis Cyclecar Co.; capital, $500,000; to manufacture cyclecars. Incorporator: William Norris Davis.

DETROIT, MICH.—Seitz Wyandotte Motor Co.; capital, $500,000; to manufacture motor trucks.

DOVER, DEL.—Kearns Motor Truck Co.; capital, $100,000; to manufacture motor trucks.

GLASGOW, KY.—Dickinson Bros. Motor Co.; capital, $12,000; to deal in automobiles. Incorporators: Brents Dickinson, B. G. Dickinson, T. D. Dickinson.

MILWAUKEE, WIS.—McDonald Motor Car Co.; capital, $10,000; to deal in automobiles. Incorporators: C. G. Pauli, John McDonald, Jr., Ida Pauli.

NEW ROCHELLE, N. Y.—Hugenot Motor Corp.; capital, $3,000; to manufacture motors, etc. Incorporators: S. H. Kent, A. D. Stubblebine, P. A. Stubblebine.

NEW YORK CITY—Automobile Engine Tester Co.; capital, $25,000; to test automobile engines. Incorporators: Robert Corin, I. M. Cohen, Sam Mirbach.

NEW YORK CITY—Bellamore Toomey Co.; capital, $30,000; to deal in automobiles, etc. Incorporators: T. H. Toomey, D. G. Bellamore, D. H. Bellamore.

OTTAWA, ONT.—Maxwell Motor Co.; capital, $10,000; to deal in automobiles.

PITTSBURGH, PA.—Mutual Taxicab Co.; capital, $10,000; to manufacture, sell and deal in and with taxicabs, motor cars, etc. Incorporators: Antonio Floecker, C. E. Meyer, M. J. Dain.

PORT JEFFERSON, N. Y.—Metco Motor Car Co.; capital, $5,000; to deal in automobiles. Incorporators: E. Hillis, L. A. Sorenson, E. C. Hobcroft.

SYRACUSE, N. Y.—Syracuse Buick Sales Co.; capital, $2,500; to deal in automobiles. Incorporators: E. A. Ross, Fred Firth, C. E. Firth.

TRENTON, N. J.—The Motor Shop; capital, $25,000; to deal in automobiles. Incorporators: R. C. Manning, J. L. Bodine, W. L. Cox, Jr.

TROY, N. Y.—S. C. Nichols, Inc.; capital, $10,000; to deal in automobiles. Incorporators: S. C. Nichols, Marion Nichols, Anna MacNeil.

RICHMOND, VA.—Henderson Motor Car Co.; capital, $25,000; to deal in automobiles. Incorporators: J. H. Harding, L. Casselman.

GARAGES AND ACCESSORIES

BOWLING GREEN, O.—Bowling Green Rubber Co.; capital, $25,000; to manufacture rubber tires of all kinds including automobile tires. Incorporators: C. W. Greene, M. L. Cope, C. P. Cope, Loren Campbell, Mont Clouse.

BUFFALO, N. Y.—Wilson Engineering Co.; capital, $20,000; to manufacture and deal in automobile radiators. Incorporators: C. G. Hulbert, W. F. Gagnon, W. H. Pfeiffer.

BUFFALO, N. Y.—Federal Auto Supply Assn.; capital, $6,000; to deal in accessories. Incorporators: W. H. Fitzpatrick, A. G. Striker, G. Clinton, Jr.

BROOKLYN, N. Y.—Ohlsson Spring Tire Co.; capital, $30,000; to manufacture tires. Incorporators: P. J. Butterly, Joseph Maddcoks.

CANTON, O.—Sanitary Rubber Co.; capital, $50,000; to manufacture and deal in rubber goods of all kinds including automobile tires. Incorporators: J. J. Lisbae, Elizabeth Lisbae, Lester King, C. C. Moegling, F. W. Crankshaw.

COLUMBIANA, O.—Columbia Tire Assn.; capital, $10,000; to deal in rubber goods of all kinds including automobile tires. Incorporators: E. L. Henderson, Thomas Mackierman, R. E. Henderson, H. W. Mackierman, A. E. Albright.

NEW YORK CITY—Auto Trip Co. of Manhattan; capital, $15,000; publishing. Incorporators: A. W. Lebourveau, D. F. Kenney, Robert Wuerz.

NEW YORK CITY—Auto Pedal Pad Co.; capital, $10,000; to manufacture and deal in pedal pad fasteners and other supplies. Incorporators: Henry Reich, E. M. Lichter, Thos. Young.

NEW YORK CITY—United States Garages; capital, $500; general garage business. Incorporators: J. H. Herman, Jr., H. D. Bristol, Rose Simon.

NEW YORK CITY—Oleo Shock Absorber Co.; capital, $30,000; to deal in shock absorbers. Incorporators: J. F. Booth, August Estelmann, H. A. Bell.

NEW YORK CITY—Sireno Co.; capital, $5,000; to deal in horns. Incorporators: G. H. Tamlyn, C. F. Pearce, W. H. Pearce.

NEW YORK CITY—Columb Tyres Import Co.; capital, $50,000; to import and deal in tires, rubber goods, etc. Incorporators: F. H. Twyeffort, B. R. Paige, A. C. Kahler.

NEW YORK CITY—Nicholas Tire & Rubber Co.; capital, $5,000; to manufacture tires, etc. Incorporators: J. C. Nichols, W. B. Hughes, D. L. Fultz.

STATESVILLE, N. C.—Caroline Motor Co.; to engage in garage business. Incorporators: S. B. Miller, L. McKnight, H. H. Yount.

RICHMOND, KY.—Dathrage Airless Tire Co.; capital, $14,000; to manufacture automobile tires. Incorporators: J. E. Collins, S. H. Dathrage, G. W. Phelps.

New Agencies Established During the Week

PASSENGER VEHICLES

Place	Car	Agent
Birmingham, Ala.	Studebaker	Haynes M. C. Co.
Blencoe, Ia.	Ford	Wm. Girman
Boise, Ida.	Cartercar	Moline Plow Co.
Boston, Mass.	Palmer-Singer	W. E. Burke
Brooklyn, N. Y.	Moon	M. J. Wolfe
Cambridge, Mass.	Westcott	Fred A. Loud
Columbus, O.	Abbott-Detroit	H. B. Snyder
Columbus, O.	Baker	M. Abel
Des Moines, Ia.	Moon	Inter State Auto & Supply Co.
Dow City, Ia.	Ford	H. W. Huston
Du Quoin, Ill.	Moon	Southern Illinois Garage & Auto Sales Co.
Hartford, Conn.	Chalmers	F. L. Caulkins & Co.
Hartford, Conn.	Oldsmobile	Palace Auto Service Co.
Henderson, Neb.	Ford	A. D. Peters
Indianapolis, Ind.	Regal	Peterson-Keyes Co.
Kenton, O.	Overland	E. C. Selbs
Kenton, O.	Studebaker	Arnett Auto Co.
Lima, O.	Buick	Lima-Buick Co.
Los Angeles, Cal.	Cartercar	Moline Plow Co.
Meriden, Conn.	Stearns	Henry White
Milwaukee, Wis.	Abbott-Detroit	E. F. Sanger Co.
Milwaukee, Wis.	Apperson	O. R. Hughes
Milwaukee, Wis.	Chevrolet	Wisconsin Auto Sales Co.
Milwaukee, Wis.	Garford	G. W. Browne, Inc.
Milwaukee, Wis.	Krit	Imperial Auto Sales Co.
Milwaukee, Wis.	Lozier	McDonald M. C. Co.
Milwaukee, Wis.	Maxwell	Maxwell Auto Sales Co.
Morgantown, W. Va.	Moon	L. J. Weaver
Morrisonville, Ill.	Moon	A. L. Stocks
New Orleans, La.	Moon	Kinch Auto Co.
Paris, Tenn.	Moon	Henry County Auto Co.
Phoenix, Ariz.	Cartercar	Moline Plow Co.
Pittsburgh, Pa.	Keeton	W. W. Hamilton
Pittsburgh, Pa.	Stearns	Pittsburg Mercer Automobile Co.
Portland, Ore.	Cartercar	Moline Plow Co.
Randolph, Ia.	Ford	Leslie O. Ross
San Francisco, Cal.	Cartercar	Moline Plow Co.
San Francisco, Cal.	Palmer-Singer	Henry L. Hornberger
Seattle, Wash.	Cartercar	J. W. Prescott
Seward, Neb.	Ford	Fred Zimmerer
Spokane, Wash.	Cartercar	Moline Plow Co.
Springfield, Mass.	Moon	J. W. Chesebro
St. Louis, Mo.	Auburn	Grand Motor Car Co.
St. Louis, Mo.	Regal	Anselm-Ganahl Motor Car Co.
St. Louis, Mo.	Wahl	M. W. Bond Auto Co.
Stockton, Cal.	Cartercar	Moline Plow Co.
Syracuse, N. Y.	Buick	E. A. Ross
Wapakoneta, O.	King	William P. Taylor
Wapakoneta, O.	Maxwell	F. M. Bowers
Winchester, O.	Moon	T. C. Hill
Winner, S. D.	Ford	A. K. DeWolf

COMMERCIAL VEHICLES

Milwaukee, Wis.	Koehler	McDonald M. C. Co.
San Francisco, Cal.	Brown	Henry L. Hornberger
Syracuse, N. Y.	Federal	E. A. Ross
Syracuse, N. Y.	Republican	A. J. Jackson

ELECTRIC VEHICLES

Milwaukee, Wis.	Ohio	McDonald M. C. Co.
San Francisco, Cal.	Borland	Henry L. Hornberger

New Stearns Carbureter—The F. B. Stearns Co., Cleveland, O., started 30 days ago fitting a new design of carbureter to its four-cylinder and six-cylinder models. It is a design conceived by L. G. Petre of the Stearns company in collaboration with the engineers of the Stromberg Motor Device Co., which is manufacturing it.

This carbureter is entirely free from springs of any nature and is without auxiliary air valves. Its air passages are as free and unrestricted as possible permitting of high air velocity, and the only obstruction in it is the butterfly throttle. It is owing to these conditions that from 5 to 6 miles per hour higher speeds are obtained with this carbureter as compared with previous ones used. The four-cylinder car runs 12 miles per gallon with it, and the six-cylinder 9.5 to 10 miles per gallon.

Fig. 1, a vertical section of the carbureter, shows the main air inlet A, which is connected with a hot air pipe from the exhaust manifold, this pipe having an adjustment to give cold air in proportions as desired.

The gasoline system consists of a long nozzle N, fed from a well W at its base, this well receiving its supply through a diagonal passage from the base of the float chamber. Extending through the center of the nozzle is a long tube T designated the low-speed adjusting tube. It is secured at its lower end to the adjusting piece M. At its upper end there telescopes with this tube another tube T1, carried in the throttle, at which point it has an opening H, and also at its lower end an opening F. The gasoline rises from the well W past a gasoline reducer D which surrounds the tube T, leaving an annular space through which the gasoline can rise around the tube. The fuel continues to rise and has two passages by which it may reach the motor, one through the center of the tube T and through the tube T1 to the space above the throttle for idling when the throttle is closed; and the other for running speeds when it rises in the space around the tube T and issues through the series of holes G in the top of the nozzle.

The operation of the carbureter for idling when the throttle is entirely closed as illustrated is as follows: Gasoline from the well W rises past the reducer D and enters the tube T through the hole E and continues to rise through the tube T1 and escapes to the motor through the opening H above the throttle. A supply of air enters through the small hole F located immediately above the top of the tube T.

As soon as the throttle is partially opened the tube T1 is lowered and telescopes within the tube T, thereby entirely shutting off the small air hole F. At this time the main nozzle opens and the holes G at the top of the nozzle come into play, the idling tube T1 practically ceasing operation.

To relieve the vacuum in the float chamber immediately after the throttle is opened and permit the gasoline to flow immediately an air vent K is used. From it the air passes through the core passage I and thence around the nozzle.

This carbureter has but two gasoline adjustments. The first is the idling adjustment at the nut M, which by turning the low speed adjusting tube T can be raised or lowered as desired. With the throttle closed the hole F is almost if not entirely above the top of the tube T, so as to permit sufficient air entering to furnish the idling mixture. The position of the hole F may be seen by removing inspection plugs located in the carbureter walls at this level, but not shown in the section. These plugs also serve to secure the venturi tube in its proper location.

The second gasoline adjustment is with the reducer D, which is a small sleeve threaded into the carbureter casting at the base of the nozzle. A series of sleeves, designated by number, is furnished, each leaving a different annular space between it and the tube T for the gasoline to rise through. In properly adjusting a carbureter to a motor these sleeves are changed until the correct running adjustment is obtained.

To get the correct idling mixture for speeds of 250 to 300 revolutions per minute the hole E is of sufficient size to permit enough gasoline for these speeds, and after this the tube T is raised or lowered, regulating the air opening F as required.

Packard Cable—Fig. 2 shows the construction of the Packard cable, manufactured by the Packard Electric Co., Warren, O. A shows the outside braid, composed of glazed thread specially selected for its strength, toughness and durability. It is wound multiple end to give perfect insulation. The color is seal brown with double red striping. The cable is impregnated with a permanently flexible enamel which is grease, heat and water-proof. The inside braid is shown at B. It is composed of glazed thread specially selected for its strength. This braid is also wound multiple end and the color is seal brown with double red striping. The first covering of Para rubber is shown at C. D indicates the third covering of Para rubber properly compounded to give maximum dielectric strength and flexibility, the color being black. The second covering, E, also of Para rubber, is scientifically compounded to perfectly vulcanize it to the first and third coverings. The core, F, is composed of forty-one strands of No. 30 soft-drawn tinned copper wire laid in reverse layers, making it flexible and round in cross-section.

Eureka Air Compressor—The A. Loppacker Auto Machine Works, Bloomfield, N. J., manufactures a four-cylinder reciprocating motor for compressing air. Fig. 3 shows the compressor mounted on wheels. This device is actuated by an electric motor of .25 horsepower operating on either alternating or direct current. The compressor works on the principle of a four-cylinder automobile motor, each cylinder drawing in and compressing air into a standpipe and thence into a filter and then through an 8-foot hose with an acorn connection to the tire. The compressor has a 2-inch bore and

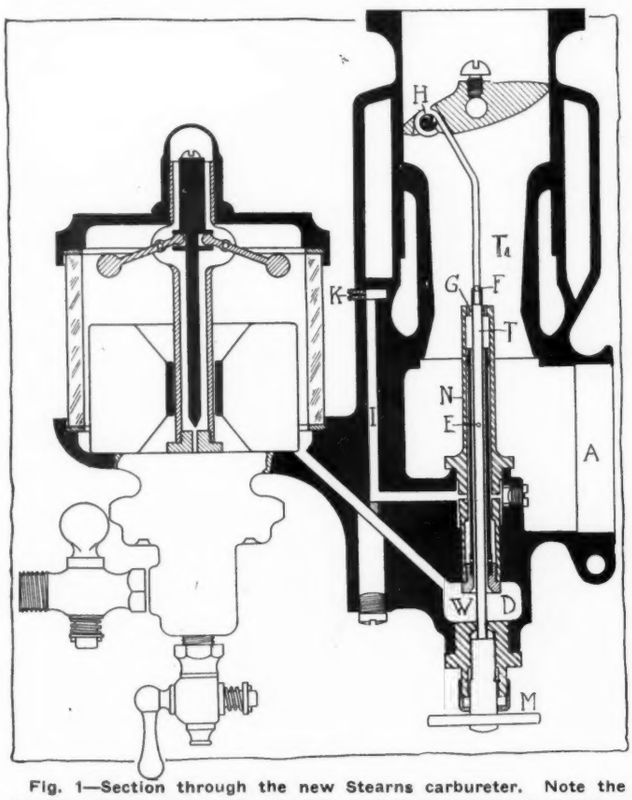


Fig. 1—Section through the new Stearns carbureter. Note the freedom from springs of all kinds and the absence of auxiliary air valves

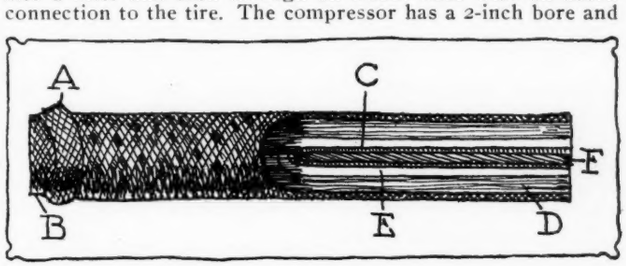


Fig. 2—Section through a piece of Packard cable, showing the layers of close-woven braiding and the coverings of Para rubber throughout

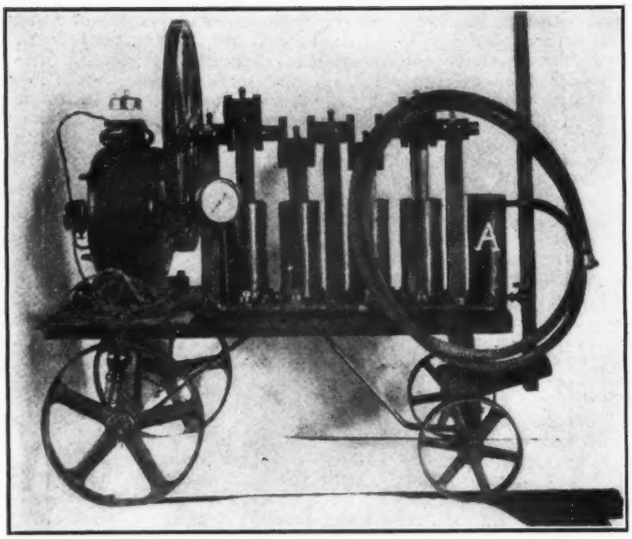


Fig. 3—Loppacker four-cylinder motor for compressing air mounted on wheels for use in a public garage

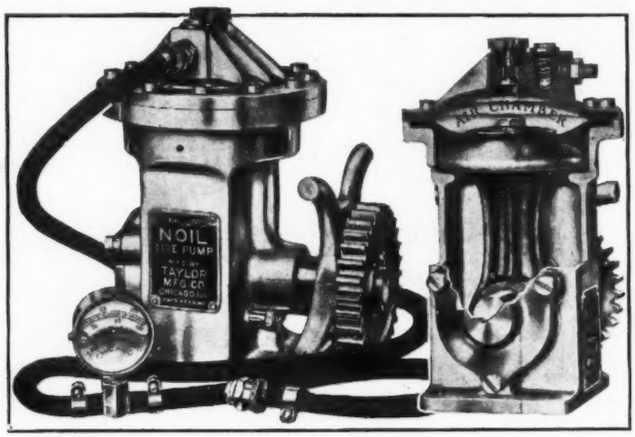


Fig. 4—At the left is shown the Taylor Noil tire pump ready to install on a car, while a partial section through the device is given at the right

3.5-inch stroke with three split rings to each piston. There is an oil filter, shown at A, at the bottom of the air container, preventing all possibility of any oil getting into the inner tube. The accumulation of oil can be blown off through the pet cock in the bottom of the filter. The manufacturer claims that the consumption of current is equal to one 16-candle-power lamp. There are liberal Babbitt bearings together with a slow speed crankshaft, 100 revolutions per minute, thus insuring long life of the machine. There is a 2-inch pressure gauge, which registers 160 pounds.

Taylor's Noil Tire Pump—The Taylor Noil Tire Pump is manufactured by the Taylor Mfg. Co., Chicago, Ill. This pump, shown in Fig. 4, is a stationary pump that is permanently attached to an automobile motor by means of a little bracket, thus permitting the sliding gear of the pump to be instantly set in motion with a twin gear applied to some conveniently-exposed shaft. By means of the long hose, shown in the illustration, it delivers air to any of the four tires with equal dispatch and ease. The manufacturer claims that about 4 minutes are required to fill the largest size tire to the proper pressure from the pump. There are no complicated parts. The pump is simple in principle and in construction. The crankcase is aluminum, the gears and plunger are of solid bronze. Its plunger is a special bronze casting and is capable of withstanding a pressure of 1,000 pounds. It employs no leather cups, no piston rings, and, due to its mechanical construction, cannot discharge oily vapor into tires. By reference to the cross-sectional view of the pump it will be seen that the air-chamber is absolutely independent of its crankcase and is separated from it by an air-tight rubber diaphram which forms the base of the air-chest. It supplies a steady, powerful flow of air. The heat of the compression is the only heat it generates. This pump measures 7.25 inches in height and weighs exactly 6.5 pounds.

Volcano Electric Primer—The Volcano Electric Primer Works, Virginia, Ill., is manufacturing a primer of new design and principle. This primer is made of brass, the working part screwing in the manifold as shown in Fig. 5 marked number 4. This little arrangement holds about a thimbleful of gasoline and extends into the manifold about .75 inch. This cup resembles the outer end of the reed of a bulb horn. This gasoline vapor is formed by placing over this cup what is called a hot plate and the gasoline is fed to it by a wick. As soon as the batteries are turned on and the gasoline touches this plate it is instantly transformed into a vapor for priming and is the same as drawing hot air in on a hot summer day. This primer was designed to prime the motor from the dash, as shown in the illustration. The advantage of this primer is that it primes the motor with an explosive gas generated in the intake manifold from gasoline by electricity furnished by five dry cells. The first quarter turn of the crank draws in the generated gas mixed with the proper amount of air, making a very explosive mixture. The second turn draws it into the cylinder to be fired. This eliminates all spinning of the motor and danger of broken arms. Owing to the construction of this primer with one teaspoonful of gasoline, which is one priming, turns an ordinary motor over 150 revolutions, giving the motor ample time to operate on its own carbureter mixture. The gasoline fount, which supplies the primer, has a capacity of 150 primings with one filling of gasoline or kerosene when used as a decarbonizer. The valve and switch, located on the dash, are so constructed that they can be operated by the driver's toe.

Endura Sheet Packing—The Endura Mfg. Co., Philadelphia, Pa., manufactures a sheet packing for use in carbureter connections, change gear cover, and, in short, wherever water, gasoline, oil, etc., are used. This packing is a vegetable fiber chemically treated so that it will withstand all conditions under the action of hot or cold water, oils, acids, gasoline, or any of those liquids that rot rubber or disintegrate asbestos. It has unusual tensile strength and does not give or squeeze out under the severest strains. It is claimed that it does not stick to the joint. This company has prepared a direction chart for the car builder or owner. A modern chassis is shown, with every part where a gasket is used numbered and indicated, and underneath the various constructions are named and the kind of gasket material to be used specified.

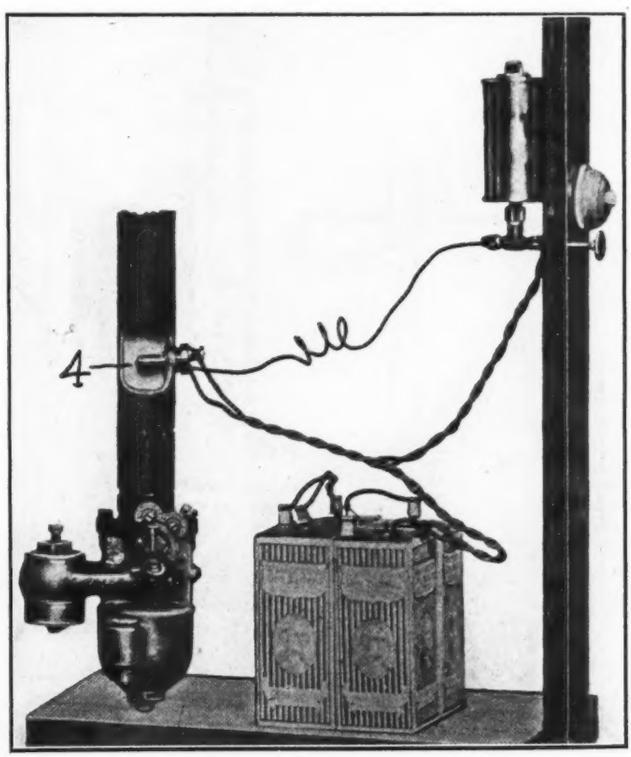


Fig. 5—Volcano electric primer as mounted for testing. The device is installed on a car in a similar manner, the primer being inserted in the intake manifold as shown.